

The Iron Age

A Review of the Hardware and Metal Trades.

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English Blast Furnaces for Burmah.

We illustrate beneath a blast furnace plant constructed by Mr. James Farmer, of Salford, for the King of Burmah. The plant, made from designs furnished by Mr. Robert. H. Holgar, chief engineer of the English Commission now in Burmah, consists of two iron cased furnaces 56 feet in height, supported on cast iron pillars, the casing being of sufficient height to admit of having boilers 12 feet in diameter.

Each furnace will be blown by three tuyeres, and there will be complete arrangements for taking off the gases for their use at the ovens and boilers.

Round the top of each furnace will be a gallery for cleaning the gas flues, and the gases will be drawn from the furnace by a circular flue underneath the floor plate of the gallery. The gases in the first instance will be taken down the gas main to an underground flue, and thence to the ovens and boilers. The arrangement is so constructed that a horizontal gas main can be afterward added if it should be found desirable.

The tops of the furnaces will be connected by a platform, and the materials will be raised to their mouths by a hoist of the water balance type, constructed by Mr. James Farmer, of Salford. The cage of the hoist has beneath it a tank which, when partially filled with water, is sufficient to lift the balance weights, and thus lower the cage to the bottom. During the time the material to be lifted is being placed on the cage a sufficient weight of water is allowed to escape out of the tank, so that on the releasing of the brake the balance weights fall and elevate the material and cage to the top. This hoist at, say, ten hours per day, is capable of lifting about 1600 tons per week, an amount of material far in excess of the consumption of both furnaces when they are working with either coal or coke. The framing of the hoist is, as will be seen, of timber, the inner corners of the corner pillars being protected by angle irons, against which the guide wheels on the cage run.

The blowing engines are of the vertical type, the framing consisting of eight fluted columns, and the blast cylinders being carried directly on the strong girders surrounding the columns, while the steam cylinders are placed directly over the blast cylinders. They are similar in style to the engines now much used in the Cleveland district, and introduced by Mr. John Giers, of Middlesbrough, the crankshaft, however, having only one bearing on the main framing, the other end being carried by a bearing in a wall box. The two engines are independent of each other, not being coupled. The steam cylinders are 30 in. and the blast cylinders 62 in. in diameter, while the stroke is 4 ft., and the engines, at a speed of about 40 revolutions per minute, will deliver about 6500 cubic feet per minute each.

Great care has been bestowed on the arrangement of the valves of the blowing cylinders, it having been desired to avoid the waste space which is found in too many of the blast engines now in use. The valves are twelve in number at each end of cylinder, six being inlet, and six outlet valves. Each valve has a series of openings $5\frac{1}{4}$ in. long, and $\frac{3}{4}$ in. in width, and the six valves forming each set have the effective area of 167 in., an area which, we may mention, is very much smaller in proportion to the size of the cylinder than that now generally adopted in the Cleveland district for similar quick running engines. All the valves are of exactly similar dimensions in each case, all the inlet and outlet valves being alike.

The pistons of the blast cylinders are of a cast iron frame, covered top and bottom by wrought iron plates $\frac{1}{2}$ in. in thickness, this construction reducing the weight of the pistons to a minimum. All bolts for screwing down the packing are let in level with the cover rings, and the pistons work within $\frac{1}{8}$ in. of the top, and $\frac{1}{8}$ in. of the bottom cylinders.

The piston rods are guided by parallel motions instead of fixed guides. From the levers of the parallel motions are worked two double acting pumps each 6 in. in diameter and with 2 ft. stroke, which raise water for the supply of the blast furnace plant.

The workmanship of these engines is characterized by accuracy and careful finish, and His Majesty of Burmah will have a pair of blast engines equal, in this respect, to any yet erected in Great Britain. There will be five boilers for the blast engines, each of 90 horsepower, arranged for working with coal, charcoal, or gas.

The Niles (O.) Iron Company is boring for gas.

Prouty's Automatic Trap for Steam Heating Apparatus.

Our illustration represents an automatic steam trap invented and patented by C. A. Prouty, of Rochester, N. Y.

It is claimed for this that after condensation it will return the water in a continuous stream from the radiating pipes to the boiler below the water line at a temperature as high as 180° or

is Geo. W. Harrold, of Rochester, New York, who will furnish any information desired.

The French Coal Commission.

The report of the French commission of inquiry into the coal industry of that country has just been made public, and deals very exhaustively with the subject of what is termed the "coal crisis." So far as France is concerned,

of tons annually. It is worthy of notice, too, that of late years this production has been very largely and rapidly increasing; but notwithstanding such a rapid increase, there is still a large difference between the production of coal in France and the consumption. In fact the deficiency is stated to be about 30 per cent., for while the production is about 17,000,000 tons, the consumption amounts to 24,000,000 tons, thus leaving the 7,000,000 of tons of deficiency

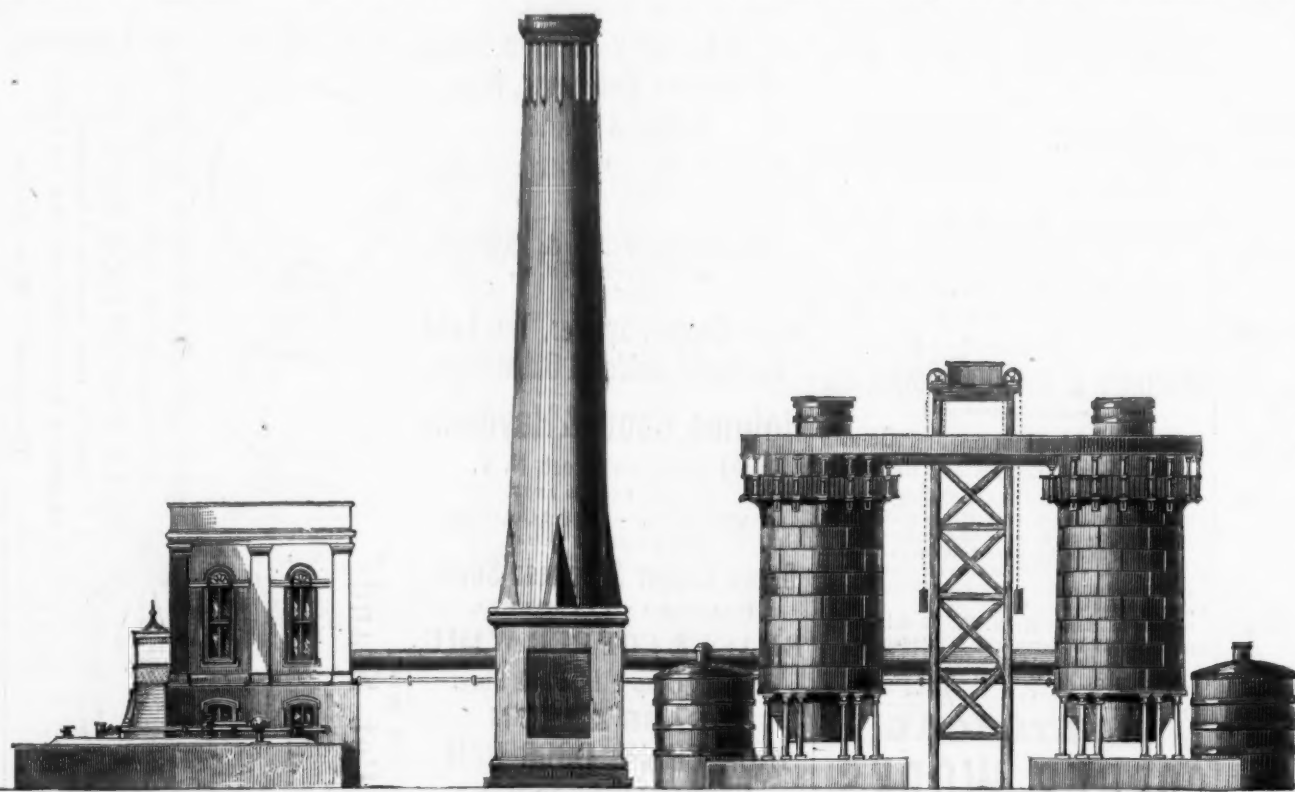
With regard to mines not worked for the alleged reason of their being unproductive, it is further mentioned as desirable that if the concessionaire, after being allowed a certain time does not work them, they are to revert to the State to be disposed of, if advisable, to other concessionaires. The commission also report that the railway tariffs for the carriage of coal present great inequalities, and they call attention to the subject, so that reform may be introduced. It is mentioned, indeed, that there are some mines of which the yield would be important, which are condemned to inactivity in consequence of the absolute want of railway transport. In conclusion the commission deprecate the idea of State intervention in working the mines or in the sale of their productions.

German Artillery.

A correspondent of the Times writes: "The committee of the Reichstag, after a prolonged discussion of the Landsturm Bill, has come to a definite resolution rejecting clause 3, which allows the government to incorporate Landsturm battalions into the Landwehr. If the Reichstag adopts this decision it will destroy the marrow of the scheme, and the government, surprised and a little irritated at the determination of the committee, is, of course, preparing an energetic opposition to it. There is no doubt that the Reichstag will reject the resolution of the committee, for it will understand that this would be almost tantamount to the rejection of the entire bill. It will be remembered that 400 millions of the war indemnity were reserved for the restoration of the war material disorganized during the campaign. It was necessary to provide for the requirements of 363 batteries and 166 columns of munitions. Provision has been made in the course of this year for 190 batteries and 118 columns of munition; 348 light field guns have been ordered of Krupp, and 1830 heavy guns, 25-8 gun carriages, 25.0 limbers, 3045 wagons for 94 columns of artillery munitions, 4356 wagons for 363 batteries, 77,213 chests for projectiles, 84,347 cases for cartridges, &c. The munitions required for 278 field batteries for the reserve for the park of munitions is estimated at 335,000 shrapnel shells, 50,000,000 cavalry balls to fill these shells, 458,072 cartridges, 814,068 grenades, 2,309,310 kilograms of coarse powder, and 384,120 metres of silk. All this has been manufactured during the present year. Forty guns of 12 centimetres diameter have also been cast; 40 short guns of 15 centimetres, with their carriages, 1395 gun carriages have been adapted for siege guns, and 187 steel guns of 15 centimetres, and 723 bronze guns of 12 and 15 centimetres have been transformed."

Accidental Discoveries in Science.—Accident has had much to do with chemical discoveries, more perhaps in former times than now, when researches are undertaken with some definite end in view; but how many of the discoveries which have led to the most brilliant and important results, may not be called accidental? We may question if Davy expected to find potassium when acting on potassa with a voltaic battery, although, having already observed the decomposition of other metallic oxides, he may have had an inkling of the fact. Bunsen did not expect to find two new metals when examining the residue from the Durckheim waters. Crooks, when looking for selenium, accidentally found thallium. Perkins, when he found that aniline, when acted on by chromic acid, gave a fine color, could scarcely have expected the enormous manufacture of those analogous dyes which is carried on at the present day.

M. Victor de Lesseps and Mr. Stewart have printed their report upon the journey they recently undertook for the purpose of tracing out a railway line between Turkestan and India. It appears from the report that, baffled by the Hindoo Koosh, they turned east, and found Kashgar to be connected by open and very gradually ascending valleys and plateaus both with Khokand and Cashmere. That this is undoubtedly so was repeatedly stated two years ago in the Russian intelligence of the Times. M. de Lesseps thinks that the most practicable road starts from Lahore, and reaching Serinagar by the Valley of the Jhelum, proceeds through the Sotchi and Karakorum Passes to Yarkand, Kanzer, Khokand, Tashkent, Orenburg, Ekaterinburg and Moscow. We may add that the Russian Government are in no hurry to act upon this advice. They will for the present content themselves with constructing a line from Orenburg to Southern Siberia. From this trunk line another may eventually be branched off in the direction of Tashkent. At the same time, the project of a canal between the Caspian and Aral is still under discussion.



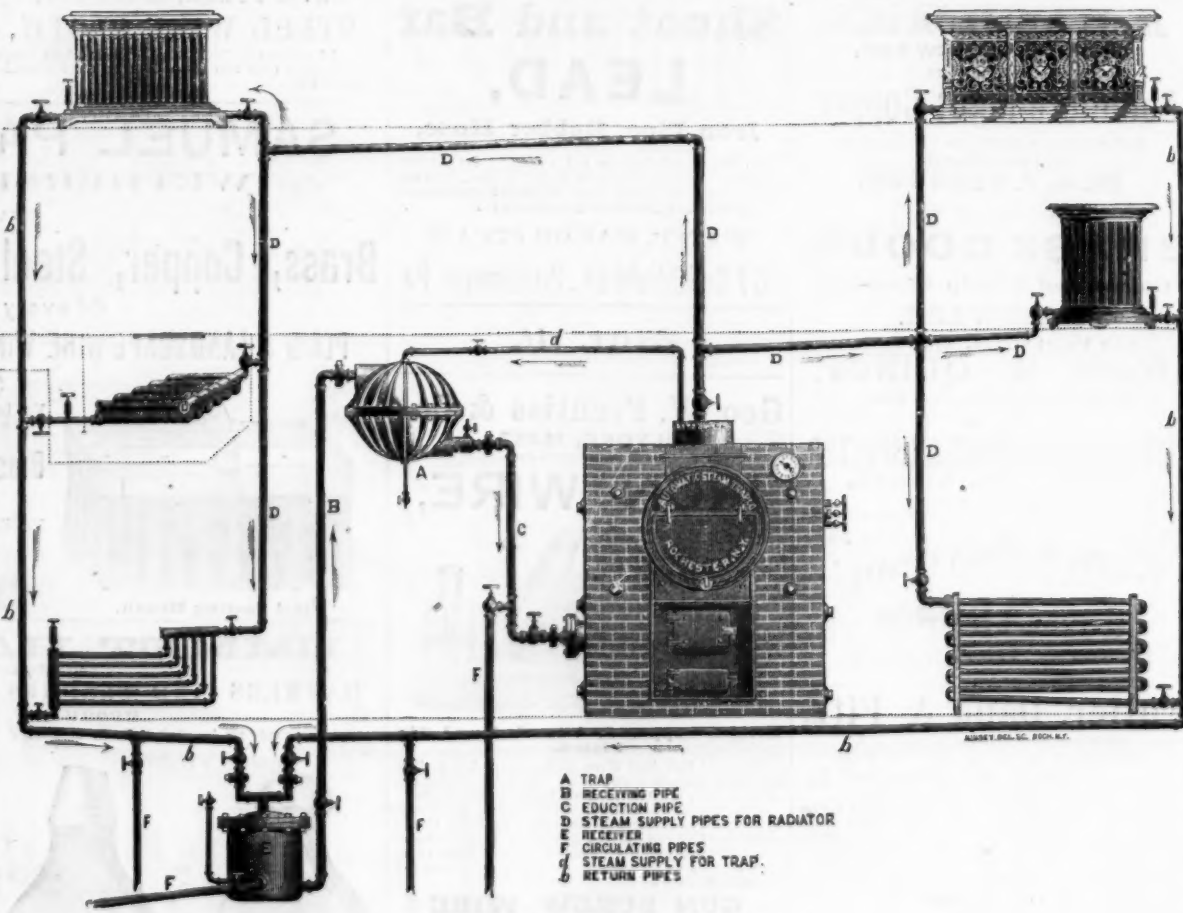
BLAST FURNACE PLANT FOR THE KING OF BURMAH.

even higher, thus requiring a very small amount of heat to again raise it to the boiling point.

As there is no machinery to get out of order, this trap, working automatically, requires but little, if any attention, and will keep the pipes comparatively free from water, thus increasing their radiating power. It is also claimed that very little water needs to be introduced into the boiler by the pump or other means.

the report states that the crisis is of foreign origin, having commenced in England, six months later proceeded to Belgium, and nine months afterward to France. The cause of this crisis is attributed to the largely increased demand of the iron trade, which from 1871 to 1873 largely augmented its production. It is pointed out that the intensity of the crisis in the French coal producing districts has been in inverse

to be made up by importation. In view of this state of affairs the commission urged the importance of all reasonable measures being adopted for the purpose of increasing the coal production of the country, so that the demand may not largely exceed the supply. The State, it is pointed out, should encourage the research for new coal beds, and as a means of doing this, should intrust mining engineers with pre-



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ratio to the distance from the English and Belgian mines. The number of coal commissions in France is stated to be 612, covering an area of 540,000 hectares; of this number of concessions, 277, covering a large extent, are not worked for various reasons, while 335, covering 371,000 hectares, are being worked and furnish, it is stated, upon the whole a production of coal amounting to no greater figure than 17,000,000

paratory geological investigations, which should form the basis for the researches of private industry. Further, with regard to the authorization for the sale of the mines of any basin, or for their amalgamation in the hands of a large mining company, the commission recommends that assurance should be given for the supply of public consumption to the same extent as was previously provided for by those mines.

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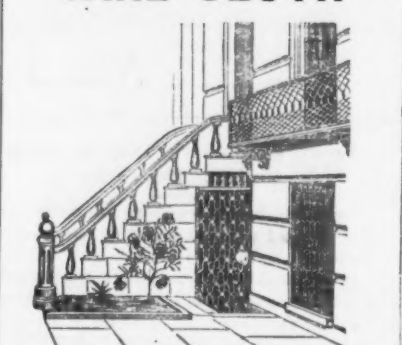


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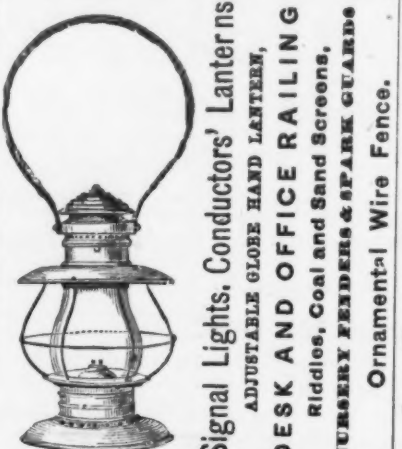
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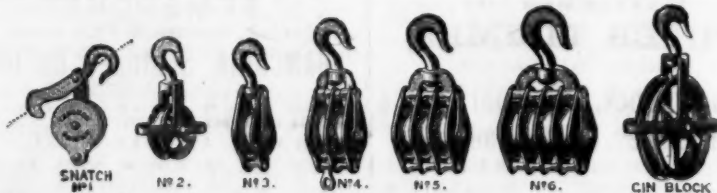
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August 25th, 1871.
November 17th, 1871.
January 2d, 1872.
March 12th, 1872.
February 4th, 1872.
November 17th, 1871.
December 24th, 1874.
Re-issue, October 28th, 1874.

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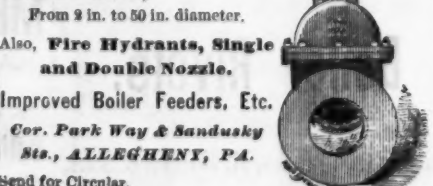
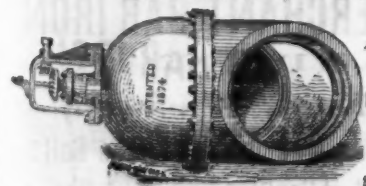


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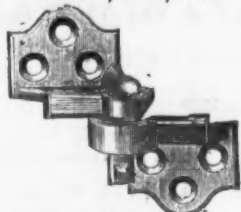
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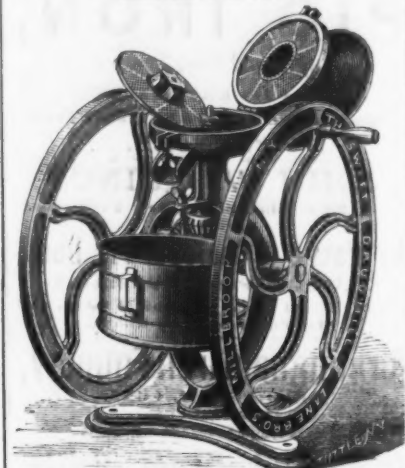


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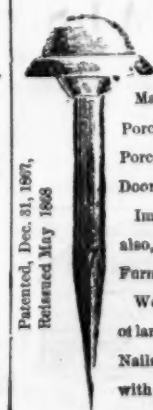
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Steam Boiler Explosions.

We have received from Mr. A. T. Hay a copy of his report to the Secretary of the Treasury on the subject of boiler explosions, from which we take the following:

When we boil pure water the steam rises regularly in spheres from the bottom of the vessel to the surface of the water.

"The volume of a confined mass of steam is inversely proportional to the pressure to which it is exposed, and directly proportionate to its absolute temperature." Steam at a like temperature and pressure has at all times the same number of molecules in a like volume, and the true measure of its energy may be calculated with mathematical precision. Water assumes three natural, or allotropic forms—liquid, solid and vapor; in all these forms its qualities inhere. What is true of a molecule of water, ice or steam, is true of the whole volume of either—these several forms being due entirely to a change of temperature.

Water is the most stable compound in nature; neither pressure, cold nor heat alone will reduce it to its original elements.

It also has a greater capacity for heat than any other known substance, except hydrogen gas.

Water, per se, is as true to its peculiar characteristics under the various degrees of temperature and pressures to which it may be subjected as the magnet is to the Polar star. Steam is an elastic fluid, and has the true measure of its energy in any given case directly proportional to its temperature and pressure. These two conditions supplement each other.

Now, the volume of a confined mass of steam being inverse to the pressure to which it is exposed, a rupture in a steam boiler must instantly reduce the internal pressure and relieve the stress; and, on the other hand, the pressure being directly proportioned to the absolute temperature, the checking in of cold water reduces the temperature and relieves the pressure or tension; which brings us to the logical conclusion that neither a weak place in a boiler nor the supplying of cold water are, in themselves, the least sources of explosion. "But," we are told, "it is the discharging of cold water on to red hot iron that does the mischief." Let us look at that in the light of truth. In the first place, water has nearly ten times the capacity and affinity for heat that iron has, and I will defy any man to heat any part of a boiler or open kettle red hot with an ordinary blast, so long as there is any considerable quantity of water therein; beside, if it were possible to have any portion of a boiler "red hot," it would be above the water line—whereas, the cold water (on river steamers) is supplied either through the mud drum or discharged by feed pipe near the bottom of the boiler. Now, it is a fact that boilers blowing up under such supposed conditions generally do at the first or second stroke of the pump. Then, I would ask, how high a few strokes of the pump will raise the hot water over a battery of boilers? Not the thickness of a sheet of brown paper.

Another fact is that many of our most terrific explosions take place under a reduction of pressure—that is, the boilers become, as it is termed, "fire hard," and sometimes it is with difficulty that a medium gauge of steam is kept up; in fact, I have known instances wherein just before an explosion ensued the steam gauge would recede from 50 pounds to 20 pounds pressure, and no amount of firing would bring up the pressure sufficient to perform the work satisfactorily. If there had been a scarcity of water there would have been a surplus of steam. When boilers fire easily and steam freely there is no danger of any fearful disaster. If a boiler gives way under such conditions it is at its weakest point, which lets off the excessive pressure and relieves the stress instantly over the whole battery. Such accidents are of frequent occurrence. They are simply ruptures, the effects of over-pressure, and not explosions in any sense of the term.

There can be no violent explosion from steam made from clean water, free from organic matter. At least, after many years close observation, coupled with direct investigation and research, I have failed to find an instance where pure simple steam made from clean water ever exploded within a range of from 15 pounds up to 500 pounds pressure to the square inch. But I do find that explosions in steam boilers (like cholera, typhoid fever &c.) revel in filth and foul water, and may be traced directly to the same source.

Take, for instance, the Mississippi and its tributaries, and it will be found that steamboat boiler explosions have been most frequent in the vicinity of large cities, and as we go down the river. The Lower Mississippi has been termed a graveyard, while that portion of the river above St. Louis, including the Illinois, where the waters are comparatively pure and free from nitrogenous matter, explosions have been very rare, while the Ohio, from Cincinnati down, is noted for many steamboat disasters. The most destructive and terrific explosions have occurred in the spring of the year, when the waters were loaded with organic substances, earthy salts and oleaginous matters.

My researches lead me to a positive conviction that these disasters have their origin in the impurities contained in the water. In a paper like this it is impossible to go into detail, or to give reasons and incidents running through many years' observations, investigation and research, but I think that the following will give a sufficient data to enable all to see the importance of avoiding foul water for steam purposes:

When we boil foul water we find it tumultuous, accompanied with a low, bumping sound, with fits and starts, so sudden and violent in some instances as to jump bodily out of or even burst an open vessel. This antagonism to the boiling of any compound solution is caused by the attraction of these foreign particles for each other (chemical action and re-

action), while in the boiling of pure water there is no chemical action whatever. Great rivers, like those of the Ohio, Mississippi and Missouri valleys, are great natural sewers, and their waters at certain seasons of the year are loaded with organic remains in every stage of putrefaction, while city wells and those around factories frequently become great sink holes and receptacles for foreign matter. My researches show that such waters hold in solution and carry in suspension from six up to sixty-three grains per gallon of organic substances, to which may be added copious quantities of oleaginous matter in certain localities and the salts of ammonia—N H₃. These substances find their way into steam boilers where they rapidly undergo chemical change, distillation, concentration, and sometimes violent decomposition—that is, culminate in terrific explosion.

These organic skeletons, glyceric salts, albuminous substances and ammoniacal gases found in water consists chiefly of carbon, hydrogen, oxygen and nitrogen; and it is among such nitrogenous combinations and types that we find some of the most remarkable explosive bodies. They are not only aeriform, but they are gases of the most subtle and potent character; gelatinous substances, in which the different elementary atoms are all chemically combined in the same molecule that are liable to sudden and violent decomposition whenever the opposing forces to which they owe their existence become deranged by heat or some external cause. Their affinities are very feeble; hence their frequent destruction at high temperatures. Merely a molecular disturbance of any kind may cause violence. Their combustion being internal and instantaneous, they develop a force at least ten times greater and a hundred times quicker than that of steam pressure—sudden and violent enough to destroy open vessels.

"The instability of all nitrogenous compounds is the striking peculiarity."

No amount of pressure or cold is able to reduce their aeriform gases to the liquid or solid condition again. But in clean water we have the most stable substances known, under three distinct forms, either of which may be safely had out of the other by merely a change of temperature. As I said before, heat alone will not decompose water, but electricity readily resolves it into its original elements, and chemical action being the source of electricity, water in the midst of fickle and treacherous company becomes demoralized and loses its virtue and stability, and goes off in a gaseous state in time of chemical reaction. This frequently occurs when boilers explode, as neither water nor steam are ejected from them, but an inflammable gas is evolved. Under such conditions the engineer, dead or alive, is convicted of murder for allowing the boilers to become dry, when, in reality, a moment before the explosion his boilers contained a full gauge of water.

"Great power in the hands of ignorant managers implies great dangers," which has been practically illustrated in American steamboating, railroading, &c. Science takes things as it finds them, and occupies itself in tracing relations and dependencies among phenomenal effects. Any investigation to have any permanent value must be based upon the natural order of things. It must be interwoven with matter, force and truth. Then intelligence becomes a true mirror that reflects things as they are. It is only by well observed and well digested facts, through patient investigation and research along the varied lines of nature, that we generate new and recast old ideas and arrive at truth and practical utility.

Economic Method of Drying Foundry Molds.

In almost all foundries the drying of the molds is effected by means of sheets of iron, on which a fierce coke fire is maintained. Here, evidently, is a great loss of caloric, for the drying is only effected by radiation, and in a space where the air has generally free access. In the case of large castings, such as cylinders, flywheels, framing, &c., this plan has also the disagreeable effect of producing great heat all around, and the molders engaged in the same building suffer seriously at times. In addition to this, it is mostly necessary to employ a crane to sustain the frame, or to employ heavy materials which have to be brought to the spot and afterward carried away again, disarranging the material of the foundry and giving rise to unnecessary work.

No improved method had been attempted that we are aware of until a few months since, when M. Dehamme invented and patented a plan which was introduced four months ago into the foundry of MM. Quillauc & Co., at Anzin, of which M. Dehamme is foreman.

The arrangement is very simple. Near the most convenient end of the mold a hole is dug in the ground, and in this is placed a coke stove, which communicates with the mold by means of a short horizontal pipe, through which all the gases of the coke pass. On the other end of the mold is mounted a chimney-pipe, the upper end of which is carried out through the roof or side of the foundry. In the chimney is a damper to regulate the draught. The stove being partially or entirely sunk in the ground, there is little or no radiation from that, and little loss of heat, and consequently of fuel, as the whole of the gases enter and pass through the mold, and are at once carried away by the pipe into the open air.

The economy is great. In certain cases in which, according to the old method, it would have required a ton of coke to dry the mold, it is effected by the new mode with one-fifth of that quantity; the saving is, however, not generally so great as this, but is said to amount to the average to 50 per cent. During the four months that M. Dehamme's system has been at work at Anzin, it has realized an economy of 600 to 700 fr. per week in the saving of coke alone, and the lighting, which, in the old time, consumed seven steres of wood per month, is now easily effected by means of a few shavings or pieces of waste wood.

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The establishment of Peter Stubbs is one of the oldest in Lancashire, and in some respects the most remarkable. Although it has existed for nearly, if not quite a century, and has, for the whole period, enjoyed a large and well deserved reputation for the excellence of its productions, it has not in any way changed its designation, or in any material respect altered the aim of its original institution. That was the manufacture of files, measuring and cutting tools and implements of similar character for the use of the higher classes of artificers in the various departments of skilled labor. It is quite true that the works themselves, as well as their producing power, have been greatly extended; but throughout the varying generations of those whom the works have supplied with tools, which they believed could not be equalled, far less surpassed, in substantial excellence elsewhere, the imprimatur of Peter Stubbs has continued to be a guarantee of unchallenged and unchallengeable quality. A lineal descendant of the original Peter Stubbs is still the head of the firm.

The original factory was not situated in the immediate locality in which the business is now carried on, although that business has been conducted in the premises in which it is still conducted, that is, in Scotland Road, Warrington, near the central part of the town. The original portion of these premises consists of what no doubt was then considered large, but with advancing ideas and the requirements of an increasing trade have now dwarfed into a comparatively small quadrangle of brick building, which still remains intact, and bears upon the lintel of its principal door the date of 1802. Subsequent to that date, and at different periods, additions to the works have been made till what may be called the nucleus of the establishment has been surrounded by extensive and stately buildings, all devoted to the accommodation of the different branches of manufacture which constitute the staple of the business. The latest and largest of these additions bears the date of 1869; and, so far as can be judged by present appearances, there seems every probability that that will ere long cease to be the newest portion of the works. Beside the establishment in Warrington, it must be stated that there is a large branch of the establishment at Rotherham, where an important and valuable portion of the work is conducted, viz., the conversion of the steel from which the various implements are made. It is also equally worthy of remark that a very considerable amount of the work of different kinds is carried on by workmen in their own homes; so that, when considering the resources of the establishment, it must be borne in mind that those manipulative resources under control, or directly connected with the works of Peter Stubbs, are not by any means to be measured by the facilities afforded on the premises at Warrington.

The firm is now chiefly engaged in the manufacture of files—at least, this is the principal item of the business. The preparation of the steel from which files are to be made constitutes an important portion of the manufacture. The steel most suitable for this purpose is made from Swedish pig iron, and the process by which this transition is effected is called conversion, and for the making of files the steel requires to be more highly converted than for other purposes, to give it a proper degree of hardness, combined with tenacity, the hardness and tenacity being equally and carefully distributed throughout the bar or general mass by careful and attentive supervision of the converting furnace, so as to insure the thorough incorporation of the required portion of carbon with every particle of the metal submitted to conversion. This is an art which can only be acquired by thoughtful attention, added to great experience, on the part of the workmen. When first prepared the steel is produced in the form of what is called bar steel. The conversion of the steel for Mr. Stubbs' establishment is carried on in the Rotherham branch; the next process is rolling the bars into rods, to effect which the bars are heated to a high temperature, and passed through a rolling mill, by which they are formed into rods of the required thickness and peculiar form, such as square, flat, triangular, or semi-circular, which the files to be made from them are intended to be. This portion of the work is also executed at Rotherham, the rods to be employed in file-making being delivered in bundles.

After their delivery in the Warrington establishment, the first process to which the drawn steel rods are subjected is forging. This is done pretty much in the same manner as forge manipulation is conducted in an ordinary smithy. The rod is heated and the end cut off to the length required for the file intended to be fabricated. It is then fashioned, under the hammer, into the shape the file is intended to assume, that is, a perfect parallelogram of cubical or flat triangular form, of either a cubical or flat or triangular shape, but pointed; or of semi-circular or other curved form, pointed or blunt, as may be desired. In this operation about forty forgemen are regularly employed. The forging being completed, the blanks are made up into bundles, and passed through an annealing furnace for the purpose of softening the steel. After having been annealed the blanks are smoothed and trimmed by filing till they have been in all respects fitted for being cut into the intended files they are to be made into. These preparatory stages having been perfected, the blanks are handed over to the cutter, who proceeds by taking a blank and placing it on an anvil, to which it is strapped down by two leather thongs worked entirely under control of the manipulator by his feet; one of the thongs passing over the file near its point, the other near the tang or point for fastening the finished file into its handle. This mode of securing the blank to the cutter's anvil is common to all the required forms and

dimensions of files whatever their size or the purpose for which they are intended. Once secured on the anvil, the cutter, applying a sharp but bluntly angular chisel to the blank, and placing it at the required angle, both as to the obliquity of the furrow to the longitudinal section of the file and also to what may be called the angle of incidence for raising the required burr on the surface of the file, he strikes it a smart blow with a hammer of peculiar construction. It is an oblong mass of steel, with the handle fixed in it at an acute angle near its upper end. These hammers, which are all nearly alike in form, vary greatly in weight in proportion to the work they are to be employed upon; some of them weighing 11½ lbs., and others so light as to be under an ounce in weight; the latter, it may be readily supposed, being for exceedingly delicate work, while the former, as may be equally obviously conjectured, is employed in the production of work of a bold and vigorous character. In all cases in which the edges of files are toothed the edge-teeth are cut first. Each blank is then submitted to the process on its side. In the case of single cut files, this is of course completed by the cutter passing his chisel once over the surface from point to tang, and the process so far as that side is concerned, is complete. In the case of double cutting, however, the operation is repeated; in the latter instance the chisel is laid at about right angles with that portion of the surface of the file which has been first cut, and in this form the cutting is completed, as before, from point to tang, and thus the teething of one side of a double cut file has been accomplished. The second side has then to undergo a precisely similar series of operations; but in this instance the toothed side of the file has a lead or power cushion interposed between it and the anvil to prevent the newly-made teeth from being damaged, if not indeed obliterated. In the case of triangular or other flat-sided files, the processes of cutting are precisely similar to those already described.

Round files, or those with semi-circular or other curvilinear cutting faces, the process of cutting or toothing is different. In these cases the cutting is performed in what is called courses. That is to say, the angular burr is struck by the chisel from the point to the tang end, in a line which, of course, varies in width, according to the breadth of the curved surface, and this is repeated until the whole of the surface has been covered by those longitudinal courses, the cut surfaces in all instances being, as before stated, protected by a pillow, or cushion of power, during the time the file is under the operation of the hammer. Files are of various forms and greatly differing lengths and sizes, in accordance with the purposes to which they are intended to be applied. In section they are made round, oval, segmental, square or triangular. In length they vary from 24 inches in length with a proportionate width of surface and thickness to the size of little more than a carpet needle in diameter, and an inch and a quarter in length. These latter are round files, and, notwithstanding their tiny dimensions, they also are cut in courses, which, however, are so delicate as to require the aid of a powerful magnifying glass to realize the existence of. Indeed, some of the files are so small that, to use the expression of one of the workmen, "they will swim in water. Beside the classes of files above referred to, this establishment also produces curved files of spatula and other forms for the use of sculptors for trimming and smoothing portions of their artistic productions in marble or bronze.

After having been cut, which is always done when in an annealed or softened state, they require to be tempered or hardened, and as they, speaking generally, are to be employed in operating on all kinds of unyielding substances, they are tempered to the hardest pitch that can possibly be obtained. This object, as experience has taught in Mr. Stubbs' establishment, is best attained by putting the heated file into a cold mixture of salt and water. Preparatory to the heating, however, the files are dipped into a vessel filled with warm bottoms, obtained from the breweries' refuse. A coating of this semi-liquid matter adheres to the file, which is then thrust among a dry powder, consisting of a mixture of ox hoof and salt. This, besides drying the paste adhering to the file, contributes not only in forming a protection to the teeth of the files from injury by friction on the coke in the tempering furnace, but likewise, by some little understood chemical process, contributes to the hardening of the file. For tempering the larger files they are heated in an ordinary smithy fire, fed by coke, and stimulated by large bellows till the file becomes of a deep blood red heat, the workmen carefully inspecting the process of heating to ensure its thorough equality all through the piece. Having ascertained this, he carefully withdraws the heated implement from the fire, and slowly and carefully dips it gradually into a large tub of the salt and water already referred to. In performing this immersion, he with equal care and caution swings it gently and sideways from side to side, and finally drops it into the tub; this care and caution are used to prevent any warping of the file during the progress of its cooling. The smaller files are treated in a somewhat similar manner, with the difference that the fire in which they are heated is a kind of cupola oven, formed of coke ashes mixed with salt and water, which forms a paste capable of drying to a sufficient hardness to last for a week. The processes of heating and cooling the small files for tempering are precisely the same as those employed for the larger, differing only in degree. If in defiance of all precautions to the contrary, some slight twisting should have taken place in the dipping, the twist is reduced by passing the file under pressure over a heavy mass of hot iron, the file being copiously supplied with rape oil. This process is what is called "setting," and, generally speaking, it is very effective.

Having passed through the various processes referred to, the files are scrubbed with a mixture of coke ashes to clear away any portion of the coating of which may have escaped the action of the fire. This is done by women, mostly the widows of the deceased workmen who have been employed in the establishment. After scrubbing the files are put into boxes and immersed in a solution of quick lime. They are then taken out and set up on end in perforated trays, and dried in an oven. After being taken from the oven they are fully brushed over with rape oil, which is found to answer well, and is economical. After oiling the files are packed up in dozens for those up to ten inches in length, and in half dozens for those of greater length. Beside file-making, Mr. Stubbs makes tools for engineers, dividers of the most delicate dimensions and the nicest adjustment, as well as those adapted to large divisions, calipers of varied sizes, hand vices, screw plates of large and small compass, saws for cutting metal, and in short nearly everything which can with propriety be designated an implement of precision for the use of artists and artisans. These latter, as has been already stated, are generally made by workmen at their own homes, and of whom it is difficult to ascertain the exact number. Beside those, however, the establishment also employ a large number of skilled workpeople, both in the Warrington works and in those of Rotherham.

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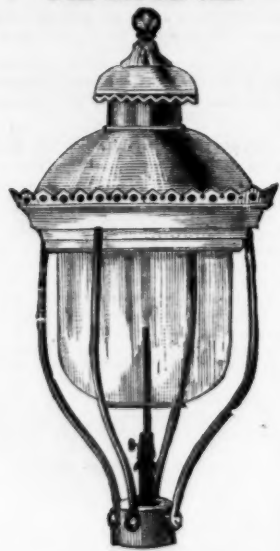
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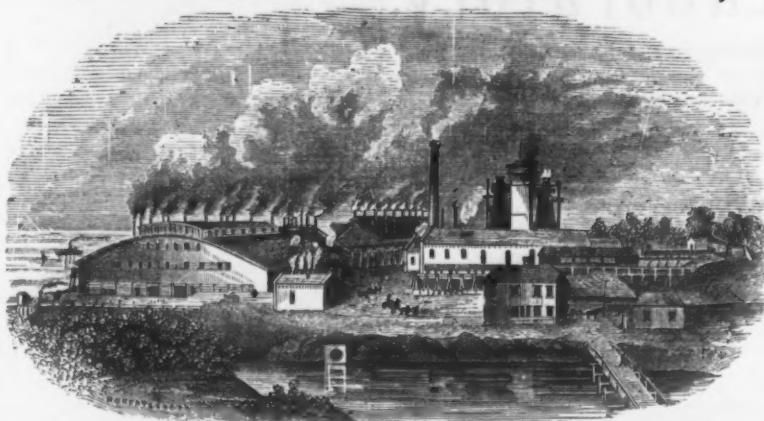


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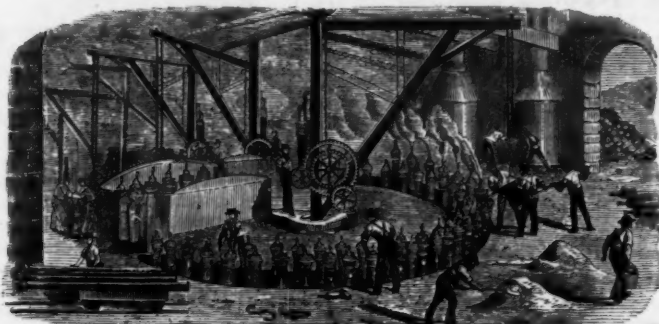
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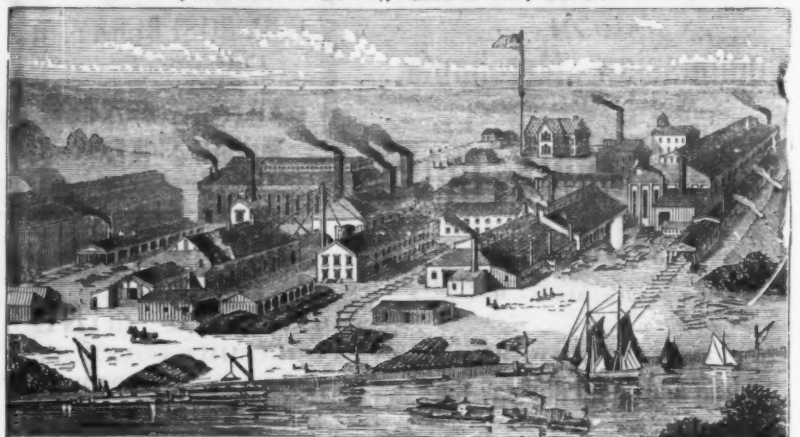
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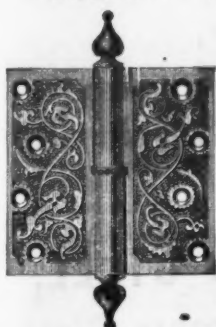
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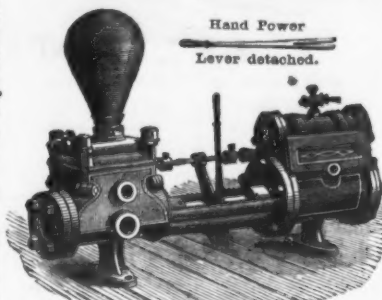
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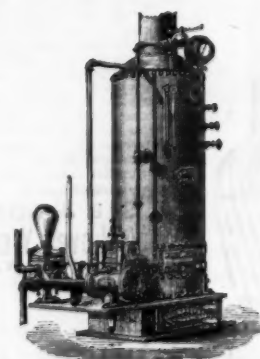
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The Effect of Acid on the Interior of Iron Wire.

Prof. Osborne Reynolds, in a paper lately read before the Manchester Literary and Philosophical Society, says: At a previous meeting of this society, Mr. Johnson exhibited some iron and steel wire in which he had observed some very singular effects produced by the action of sulphuric acid. In the first place, the nature of the wire was changed in a marked manner, for although it was soft charcoal wire, it had become short and brittle; the weight of the wire was increased; and what was the most remarkable effect of all was that when the wire was broken, and the face of the fracture wetted with the mouth, it frothed up as if the water acted as a powerful acid. These effects, however, all passed off if the wire were allowed to remain exposed to the air for some days, and if it were warmed before the fire, they passed off in a few hours.

By Mr. Johnson's permission, I took possession of one of these pieces of wire and subjected it to a further examination, and from the result of that examination I was led to what appears to me to be a complete explanation of the phenomena. I observed that when I broke a short piece from the end of the wire the two faces of the fracture behaved very differently—that on the long piece frothed when wetted and continued to do so for some seconds, while that on the short piece would hardly show any signs of froth at all. This seemed to imply that the gas which caused the froth came from a considerable depth below the surface of the wire, and was not generated on the freshly exposed face. This view was confirmed when, on substituting oil for water, I found the froth just the same. These observations led me to conclude that the effect was due to hydrogen, and not to acid, as Mr. Johnson appeared to think, having entered into combination with the iron during its immersion in the acid, which hydrogen gradually passed off when the iron was exposed. It was obvious, however, that this conclusion was capable of being further tested. It was clearly possible to ascertain whether or not the gas was hydrogen, and whether hydrogen penetrated iron when under the action of acid. With a view to do this I made the following experiments:

First, however, I would mention that after twenty-four hours I examined what remained of the wire, when I found that all appearance of frothing had vanished and the wire had recovered its ductility, so much so that it would now bend backward and forward two or three times without breaking, whereas, on the previous evening, a single bend had sufficed to break it. I then obtained a piece of wrought iron gas pipe, six inches long and five-eighths inches external diameter, and rather more than one-sixteenth inch thick; I had this cleaned in a lathe, both inside and outside; over one end I soldered a piece of copper so as to stop it, and the other I connected with a piece of glass tube by means of India rubber tubes. I then filled both the glass and iron tubes with olive oil, and immersed the iron tube in diluted sulphuric acid, which had been mixed for some time and was cold. Under this arrangement any hydrogen which came from the inside of the glass tube must have passed through the iron. After the iron had been in the acid about five minutes small bubbles began to pass up the glass tube. These were caught at the top and were subsequently burnt and proved to be hydrogen. At first, however, they came off but very slowly, and it was several hours before I had collected enough to burn. With a view to increase the speed I changed the acid several times without much effect until I happened to use some acid which had only just been diluted and was warm; then the gas came off twenty or thirty times as fast as it had previously done. I then put a lamp under the bath and measured the rate at which the gas came off, and I found that when the acid was on the point of boiling as much hydrogen was given off in five seconds as had previously come off in ten minutes, and the rate was maintained in both cases for several hours. After having been in acid some time the tube was taken out, well washed with cold water and soap, so as to remove all trace of the acid; it was then plunged into a bath of hot water, upon which gas came off so rapidly from both the outside and inside of the tube as to give the appearance of the action of strong acid. This action lasted for some time, but gradually diminished. It could be stopped at any time by the substitution of cold water in place of the hot, and it was renewed again after several hours by again putting the tube in hot water. The volume of hydrogen which was thus given off by the tube after it had been taken out of hot acid was about equal to the volume of the iron. At the time I made these experiments I was not aware that there had been any previous experiments on the subject; but I subsequently found, on referring to Watt's "Dictionary of Chemistry," that Callotet had, in 1868, discovered that hydrogen would pass into an iron vessel immersed in sulphuric acid. See *Comp. Rend.* lvi., 847. The facts thus established appear to afford a complete explanation of the effects observed by Mr. Johnson.

In the first place, with regard to the temporary character of the effect, it appears that hydrogen leaves the iron slowly even at ordinary temperatures—so much so that after two or three days' exposure I found no hydrogen given off when the tube was immersed in hot water. With regard to the effect of warming the wire—at the temperature of boiling the hydrogen passed off 120 times as fast as at the temperature of 60°. Also when the saturated iron was plunged into warm water the gas passed off as if the iron had been plunged into strong acid; so that we can easily understand how the hydrogen would pass off from the wire quickly when warm, although it would take long to do so at the ordinary temperatures. With regard to the frothing of the wire when broken and wetted, this was not due, as at first sight it appeared to be, simply to the exposure of the interior of the wire, but was due to warmth caused in the wire by the act of breaking. This was proved by the fact that the froth appeared on the sides of the wire in the immediate neighborhood of the fracture, when these were wetted, as well as the end; and by simply bending the wire it could be made to froth at the point where it was bent. As to the effect on the nature and strength of the iron, I cannot add anything to what Mr. Johnson has already observed. The question, however, appears to be one of very considerable importance, both philosophically and in connection with the use of iron in the construction of ships and boilers. If, as is probable, the saturation of iron with hydrogen takes place whenever oxidation goes on in water, then the iron of boilers and ships may at times be changed in character and rendered brittle in the same manner as Mr. Johnson's wire, and this, whether it can be prevented or not, is at least an important point to know, and would repay a further investigation of the subject.

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An Improvement in Gas Engineering.

In a paper lately read before the North British Association of Gas Managers, Mr. Geo. Boyd, of Alloa, described an improved dip for hydraulic mains, which will interest some of our readers: The author said the hydraulic main had engaged his attention for some years past, and his first endeavors were directed to drawing off the tar as it accumulated, leaving the supernatant liquid for the gas to bubble through. Those endeavors, he was glad to say, had been entirely successful. By simply placing an intercepting plate of iron across the main, close to the exit pipe, he compelled the tar to flow underneath the plate, and leave the lighter liquid behind; and at the same time he lessened the seal as far as he could with safety do so, namely, in a half inch. Since he had adopted that method, choked pipes had been comparatively a rare thing with him, and the accumulation of carbon in the retorts had never given him any trouble. His next endeavors were directed to doing away with the seal of the dip pipe altogether. Gas engineers, he said, now considered that the seal in the hydraulic main had more to do with the deposition of carbon in the retorts, and choked in the ascension pipes, than the back pressure from the purifiers and gasholders, and if it could be removed altogether the gas would be sent into a chamber consisting of the whole length of the hydraulic main and the pipes leading to the purifiers, instead of the confined space represented by the comparatively short pipe between the retort and the hydraulic main. The gas, in this case, would be more freely generated, and the particles of carbon would have freedom to expand; and a greater yield of gas with an increase of illuminating power and less production of the tar, were results reasonably to be expected, if the seal could be entirely removed. The schemes that had been brought forward to accomplish that end were, with two exceptions, all worked by means of a stuffing box; but owing to the temperature existing in the ascension pipe, the stuffing boxes would be likely to give an immense deal of trouble, and be very fruitful of leakage, even though asbestos, the substance successfully used by the president for sealing the retort lids, were employed.

The author's improved dip pipe obviated the use of a stuffing box altogether, and it was so simple in its construction that it would never be liable to get out of order. The ordinary dip pipe is cut off about one and one-half inches above the water line of the main, and a conical seal is turned into it, into which a corresponding piece of pipe is fitted, which the author has named a hollow plug. Across the bottom of this hollow plug there is attached a knec bridge plate, into which the half-inch rod for working the plug is screwed, and into the bonnet of H pipe a one inch malleable iron tube is fixed with two jam nuts, and allowed to dip into the liquid to a depth corresponding to the low end of the hollow plug when in its seat. The half inch rod which is attached to the hollow plug works inside the one inch iron tube, the top end of the rod being attached by a linked joint to the short arm of a weighed lever, which keeps the hollow plug closely applied to its seat. Every part works freely, and there is no friction on the plug rod, so that it is hardly possible for the apparatus to get out of order. Another important point is that it can be fitted to existing dip pipes at a comparatively trifling cost, and one great advantage is, that should the stoker omit to open the valve after closing the retort, no accident can happen, nor can the retort suffer any damage, for while in that condition it is nothing more nor less than an ordinary dip pipe. Alluding to this subject in his recent address to the British Association of Gas Managers, Mr. Livesey considered it "desirable that such an invention should be self-acting, not liable to get out of order, very simple and inexpensive, capable of adaptation to existing apparatus, and one that, should it get out of order, would not interfere with the free passage of the gas." In conclusion, the author spoke of his invention meeting all these requirements, with the exception that it is not self-acting, and was not sure that it was desirable that it should be so if that condition were obtained by sacrificing simplicity.

Those who wash their silverware with soap and water, as the common practice is, do not know what they are about. The proprietor of one of the oldest silver establishments in the city of Philadelphia says that housekeepers ruin their silver by washing it in soap suds; it makes it look like pewter. Never put a particle of soap about your silver, then it will retain its original lustre. When it wants polish, take a piece of soft leather and whiting, and rub it hard.

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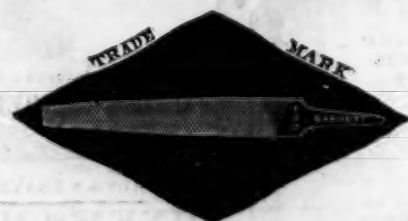
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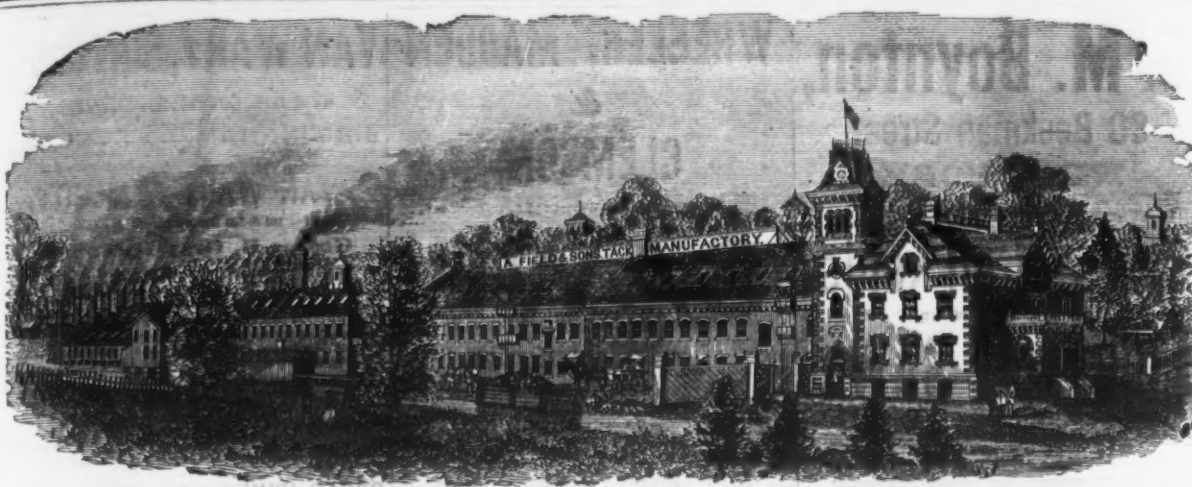
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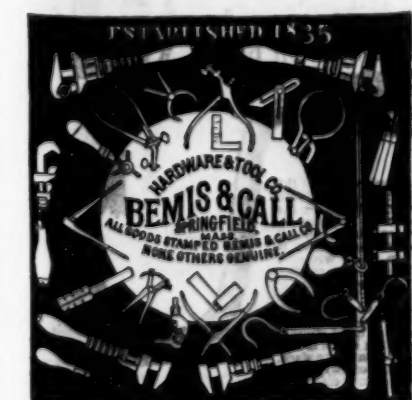
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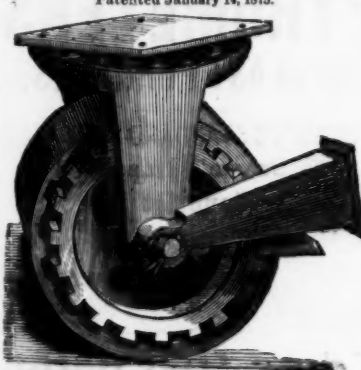
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BUSINESS ITEMS.

PENNSYLVANIA.
 Dawson & Bailey, of the Connelleville Locomotive Works, are adding to their buildings a structure 100x45 feet, in which they will place their locomotives while receiving the "finishing touches." A few days ago they shipped a locomotive to the Ohio and Toledo Railroad Company, and are now at work on four of the great Mogul engines, to be shipped to St. Louis, and have orders for seven more of the same pattern for different other roads.

The Pennsylvania Tack Works of C. P. Weaver & Co., at Norristown, makes over 600 different grades and sizes of small nails and tacks, embracing carpet cord, upholsters' gimp, cheese box, miners', cigar box, lasting, lace and every other variety of fine tacks; also finishing, trunk, clout, Hungarian, Swedes and American iron shoe nails, zinc and copper nails of all descriptions, and 3d fine boat and roofing nails. The building is 35x150 feet, two stories, in which are as many tack and shoe nail machines as it will contain.

Several acres of ground are about being purchased or leased in this city for the storage of pig iron manufactured in this region. Six acres have been leased at Allentown for this purpose, and similar yards are to be established at Reading, Scranton and Pittsburgh. Each manufacturer is expected to send his iron to the yard, paying five cents per ton for weighing and storage. On the receipt the manufacturer will receive a certificate, which will be negotiable. This is the English plan of storing pig iron—at producing cities instead of at the seaboard.
 —Harrisburg Patriot.

The Sharon Times says that Kimberly, Carnes & Co.'s Iron Works, of that place, will resume operations immediately after the Christmas holidays, in all its branches, with a reasonable prospect of continuing all winter. This will be gratifying intelligence to many of our people, who apprehended dire results from the idleness which was threatened.

NEW JERSEY.
 The works of the Phillipsburg Manufacturing Company are being run with a full set of hands. The manufactures of the company consist of nuts, bolts, special forgings, etc., beside which they take contracts for all descriptions of bridges. They have a machine shop, 40x230 feet; finishing shop, 50x160 feet; blacksmith shop, 70x100 feet; pattern shop, 30x40 feet, and warehouse, 35x45 feet, two stories. About 250 men are now employed.

The Phoenix Iron Works, at Trenton, are preparing the materials for an iron bank building which is to be erected in Port au Prince, Hayti.

The last of the iron work for finishing up the interior of the New York post office came out of the sand at Carr's foundry, Trenton, last week.

At Phillipsburg, the Warren Foundry and Machine Company are engaged in the manufacture of cast iron gas and water pipes. The company was organized in 1856, and have now a capital of \$300,000. The works cover about ten acres of ground, and have been steadily running since the panic, turning out 25,000 tons of pipe annually, valued at \$1,500,000.

CONNECTICUT.
 The Meriden Britannia Company have shut down their works for three weeks, to give them an opportunity to make necessary repairs and take an inventory of stock.

The New Haven Manufacturing Company, of New Haven, Conn., manufacture a great variety of machinists' tools, making a specialty of lathes, planers and drills, for which they have established a high reputation. Their main buildings are of brick, 230x45 feet, and two stories in height, with an L 175x45 feet, and two stories, with other buildings connected. They employ, when running to their full capacity, 150 hands. This is a stock company, organized in 1852, with a paid-in cash capital of \$275,000, and have no liabilities. Their works cover about three acres. They have recently made very valuable improvements on some of their machinery, among which may be mentioned a planer 36 feet long, 6 feet square, weighing 40 tons, with double heads and all the modern improvements; also, a lathe with 41 feet bed.

The horse nail factory at New London has resumed operations.

It is expected that the new Tariffville screw factory will start in the spring. The works consist of three fine brick buildings, an office, a large building for packing and the factory. This latter is 225 by 80 feet. Men are busily at work laying the floors and getting it ready for the machinery.

Southampton seems to be waking up again from its period of dullness. H. D. Smith & Co.'s shop is running full time, ten hours a day. The rolling mills commenced work on the 23d ult., without a reduction of wages.

MASSACHUSETTS.
 Smith & Wesson, the Springfield pistol manufacturers, have taken a contract to make 10,000 of their largest size pistols for the Russian army.

The Border City Herald says: "The Atlantic Works, of East Boston, have contracted with Messrs. Joseph Church & Co., of Fall River, to build for them a steam vessel of the following dimensions: Length 110 feet, breadth 18, depth 8, with her accommodations, engine and all complete, to be employed in the porgy fishery. She will have an upright condensing engine, with 18 inches diameter of a cylinder and 18 inches stroke of piston, applied to a propeller about 6 feet in diameter with 4 blades."

Johnson & Bye & Co., Worcester, occupy over 15,000 feet of shop room and employ 100 hands. They manufacture 5 and 7-chamber revolvers of six different varieties—a very simple, light, strong, and effective weapon. They also make a combination wrench that will fit all the uses of a tool, and is handy in the shop, store, or home, in the many and various uses it will serve. It is quite popular and sells very large.

ly. They have just begun the manufacture of a new iron plane, for carpenters and cabinet makers. The firm have been running four years, are practical and experienced mechanics, and are running their shop full time.

The iron works at Norwood are running on full time.

John Dean & Co., of Worcester, manufacturers of japanned iron plates for painters' and lithographers' uses, employ 25 men, and turn out annually over \$100,000 worth of plates. They also run a shop with 12,000 feet of room, manufacturing trunk rivets. They employ 35 men, and turn out over 100,000 gross a year. The rivets are put up in barrels of 400 gross each. The members of the firm are John Dean and E. Morgan.

On the 15th ult. the Fitchburg Machine Company shipped two car loads of machinery to Philadelphia. They also shipped on the same day to the Saxonville Mills an engine lathe weighing 15,000 pounds, with 30 feet bed, and 50 inch swing. A car load will be immediately shipped to St. John, N. B.

Bricklaying on Winslow's Skate Factory, at Worcester, has apparently been suspended till spring.

MAINE.
 The Kennebec Wire Works, at Hallowell are in successful operation.

OHIO.
 The Greenup Independent says: The members of the firm known as Buffalo Furnace Company have organized under their charter and made an assignment to John Seaton, as trustee, the trust, however, not to take place until 1878. The furnace is now in successful operation, running up the stock on hand.

The Ohio City Iron and Nail Works, at Martin's Ferry, have in operation 50 nail machines, and contemplate having 50 more at work by the first of May. The Benwood Furnace, at the same place, is blowing.

"Leontia Manufacturing Company," for the manufacture of tools of all kinds, is the name of a new firm, now locating at Leontia.

The Cuyhoga Falls Iron Rivet Company are opening out with flattering prospects of success. They have recently received an order from one house in Cleveland for twenty-five tons of rivets.

The Alden Press Works, of Canton, have received an offer of \$40,000 for the right to manufacture their presses in England. They want \$50,000.

The Stillman & Bierce Manufacturing Company, of Dayton (Ziba Crawford, vice president and treasurer; G. N. Bierce, secretary), has just shipped one of their Eclipse turbine water wheels, of which they are the manufacturers, to Hokitika, New Zealand, to drive a mill, an additional evidence of the estimation placed upon machinery of American manufacture, and of the growing foreign demand for the same.

A. A. Simonds, late of Fitchburg, Mass., is erecting in Dayton, and will soon occupy, a brick shop for manufacturing rag-engine knives and bed plates, planing machine knives, &c., using water-power.

Phosphates and Alum a By-product in Dephosphorizing Iron Ore.


Carl Rademacher & Co., of Prague, exhibited at Vienna, in 1873, some phosphates prepared from the waste phosphorus solutions obtained at Kladno, in Jacoby's process for dephosphorizing iron ore. This process consists essentially in treating the ores with sulphurous acid, whereby the insoluble basic phosphates are converted into acid phosphates and dissolved. By merely heating the solution obtained, a portion of the phosphate of iron and alumina are precipitated, or lime is added to the solution, and the precipitate which forms is employed for agricultural or chemical purposes.

The composition of the precipitate formed by heating is not constant. Several analyses were made in Rademacher's works, where alum is made from it, and will give some idea of its approximate composition. They are as follows:

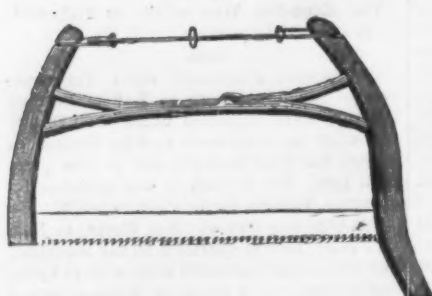
Phosphoric acid.....	30.74	22.72	24.20
Alumina.....	22.72	25.13	25.34
Oxide of iron.....	1.56	1.78	2.96
Insoluble residue.....	7.07	4.59	3.74
Water.....	38.06	36.19	35.79
Sulphuric acid.....	9.31	9.11	8.89

In the first eight months of 1873, in which the Kladno phosphates were made use of, about 90 tons of potash alum was manufactured from them, and the phosphoric acid solution thereby obtained, and containing about 25 per cent., was converted into superphosphate containing 21 to 23 per cent.

Survey of the Isthmus of Darien.
 Lieut. Fred. Collins, of the U. S. navy, who is a well known explorer, and an active Fellow of the American Geographical Society, is about to make his fourth journey to the Isthmus. The object of the expedition is to make a more careful and extensive survey of the Napipi route than has been accomplished by previous expeditions. The explorers who have gone there before have had to grope their way laboriously through the country, without maps, roads, or means of transportation, inhabited only by a few straggling families of Indians, and marked with almost impenetrable forests. The present expedition, equipped with maps thus constructed by the former explorers, will be enabled to go directly to the spot where they wish to commence their work, and by confining their labors to a comparatively limited area, it is thought they will be able to acquire, in a short time, all the data required for the construction of the projected canal. Members of the expedition will start on Jan. 2, 1875, for Aspinwall, where they will take the United States steamer Canandaigua, which will convey them to the Gulf of Uraba, and furnish them with transportation up the Atrato River to Napipi, where they will begin work. Their return may be looked for in May next. It is believed that this will be one of the most successful expeditions ever sent out by the government.

GEORGE GUEUTAL & SON,
39 West 4th St., New York.
IMPORTER OF
 **Wood Screws, Steel in Sheets,**
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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MANUFACTURER OF
Saws of all kinds.
FACTORY, WILLIAMSBURG, N. Y.



Elliptic Forked Saw Frame.
Patented June 28th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**
\$1.50 Per Foot.  Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO., Indianapolis, Ind.**, who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.
E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

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HARDWARE FACTORS.

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Manufacturers of all kinds of **SAWS AND PLASTERING TROWELS.**
ROCHESTER, N. Y.

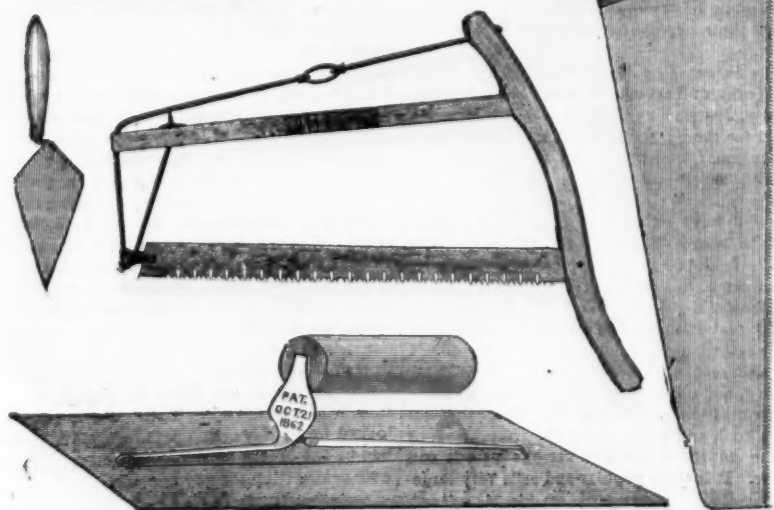
Dietrich's Patent Wood Saw. Guaranteed the strongest, lightest, easiest to strain or tighten and best braced wood saw made; also to give perfect satisfaction.

Dietrich's Patent Double Handle Rip Saw. All will readily see the benefit of this useful invention.

J. Flint's Patent Plastering Trowels. The best made and finished Trowels in the world. We make four grades of Plastering Trowels, from the best to the cheapest.

Our patent method of grinding hand saws makes them superior to any in the market.

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Manufacturer of

Saws of all kinds.
Also Sole Manufacturer of
LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on the tooth.

I am willing and extremely anxious, on proper notice, to accept a Challenge from H. Disston & Sons, or any responsible Saw Manufacturer, and am ready to back my words with appropriate deeds and \$500 expense, if beaten.

N. B.--With Hand, Billet or Cross Cut Saw, \$500 on each.
E. M. BOYNTON.



**Putnam's Government Standard
FORGED**

HORSE SHOE NAILS.

Manufactured from the best of **NORWAY IRON.** and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,
NEWPORT, MASS.

**PYROMETERS
for BLAST FURNACES.**

**E. BROWN'S STANDARD PORTABLE,
E. Brown's Improved
Gauntlet**



Edw. BROWN,
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ALSO FOR SALE
PYROMETERS
For Baker's Ovens, Boiler Flues, Galvanizing Baths, Oil Stills, Vulcanizers, Superheated Steam.
E. Brown's Portable Blast Gauge for the plug hole, Steam Gauges, Blast Gauges, Mercury Gauges, Recording Steam Gauges, Engine Counters, Indicators for ascertaining the Horse Power.



Over 300 "Gauntlet" and 100 Portable Pyrometers are now in use at Blast Furnaces.
Circulars on application.

**WHEELER, MADDEN
&
CLEMSON,**
Manufacturers of Warranted Cast Steel

SAWS
of every description,
including

Circular, Shingle, Cross Cut, Mill, Hand, Roberts' and other Wood Saws, &c., &c

Cast Steel Files

of the well known brand of

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FACTORIES:

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BRANCH OFFICE:

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BRUNDAGE FORGED HORSE NAILS,

Manufactured from

BEST NORWAY IRON,

by **BRUNDAGE & CO.** Sold by

WHEELER, MADDEN & CLEMSON

Middletown, Orange Co., N. Y.



I make a specialty of the **LARGEST SIZES** of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a **DEAD** heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed **BALANCES PERFECTLY**, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who have devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.



The Sugar Maker's Friend.

More agents wanted to canvass for the sale of Post's Patent Galvanized Eureka Saws, Circulars and Terms sent on receipt of 25cts to pay postage. Address, C. C. Post, Manufacturer & Patentee, Burlington, Vt.

Backus's Patent Bit Brace

AND
**Angular Extension
BORER.**

Q. S. Backus,

SOLE MANUFACTURER OF

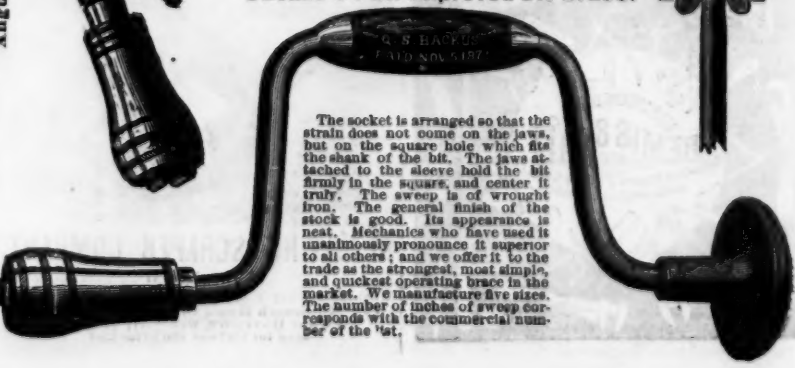
ANGULAR EXTENSION BORER.

Salesroom, 82 Chambers St., N. Y.

This tool can be used in any brace, at any angle, and also for straight work. Is the best and most convenient tool of its kind ever offered to the public. Eight thousand sold the first year.

Also Manufactures the Straight Extension

Backus's Pat. Improved Bit Brace.



The socket is arranged so that the strain does not come on the jaws, but on the square hole which fits the shank of the bit. The jaws attached to the sleeve hold the bit firmly in the square, and center it truly. The sweep is of wrought iron. The general finish of the stock is good. Its appearance is neat. Mechanics who have used it unanimously pronounce it superior to all others; and we offer it to the trade as the strongest, most simple, and quickest operating brace in the market. We manufacture five sizes. The number of inches of sweep corresponds with the commercial number of the bit.

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Hardware Commission Merchants,
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At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for **John Rimmer & Son's Celebrated Harness and other Needles.**

Agents for **Seydel's "Ashantee" Pocket Hammock**

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SCHOLEFIELD, GOODMAN & SON.

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JOHN MAXHEIMER,

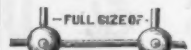
Patented,

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Dec 23, 1873 Jan.

20, 1874.

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Bright Metal

BIRD CAGES.

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NEW YORK.

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Moulders' and Plasterers' Tools.

Manufacturers of and Dealers in all descriptions of Moulders' and Plasterers' Tools, and Dealers in General Hardware, Gilded Copper Weather Vanes, CARTER'S PATENT CARRIAGE LIFTING JACK, &c.

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John Russell Cutlery Co.,

Factories and Office,
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Manufacturers of

TABLE CUTLERY,

Butcher, Painters' and Druggists' Knives
IN GREAT VARIETY.

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.

Fine Ivoride Handle Table Cutlery, very White and Durable.

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Manufacturers of all kinds of

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LARGE STOCK OF

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American, German, English

Pen, Pocket & Com-
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Scissors Scissor Cases

Razors, Hones, Stropps, &c.,
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TABLE KNIVES AND FORKS OF ALL KINDS,
AND EXCLUSIVE MAKERS OF



And the "Patent Ivory" or Celluloid Knife. These handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

THE MILLER BROTHERS CUTLERY CO.,

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PATENT FINE PEN & POCKET CUTLERY

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The only knives made that are put together in such a manner that there is no strain on the covering or on the blade. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

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which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory or by

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FRIEDMANN & LAUTERJUNG,

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Pen and Pocket Cutlery, Solid Steel Scissors, F. & L. Shears, Razors,
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Sole Proprietors of the renowned full concave patent

"ELECTRIC RAZORS."

Also Agents for the BENGALL RAZORS.

American Table Cutlery, Butcher Knives, &c.
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The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

PLANE IRONS.

Gonges of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns, Chisel Handles of all kinds. Orders filled promptly; generally same day as received.

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NEW YORK KNIFE CO.

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WARRANTED TO BE MADE OF THE BEST
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WALKILL RIVER WORKS,

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Wood's Hot Water-Proof Table Cutlery.

Handsome, Cheapest, most Durable Cutlery in use.
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Celebrated I-XL Cutlery, Razors, &c.

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Corporate Mark

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CELEBRATED CUTLERY,

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The demand for Joseph Rodgers & Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam work.

To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark.

Notice of Removal.

ASLINE WARD,

From 54 Beekman St. to No. 101 and 103

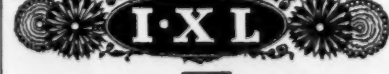
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CUTLERY AND RAZORS,
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FRED'K WARD & CO., SHEFFIELD,

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ROMER & CO.,

Established 1857.

Manufacturers of Patent Brass Pad Locks for

Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Plan

and Sewing Machine Locks.

141 to 145 Railroad Avenue, NEWARK N. J.

Illustrated Catalogue sent on application.

Patented Steam and Hydraulic, April 1, 1868.



EAGLE PACKING,

Of various sizes for ENGINES and PUMPS,

manufactured by JAMES GLANDING & CO., No.

115 Queen St., Philadelphia. What the proprie-

tors claim for the Eagle Packing: 1. Its general

adaptation to all purposes for which packing is used.

2. Its durability. It will outlast any other article

in use. 3. Its cheapness. It can be furnished to

the consumer at a lower rate than any other packing

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, Jan. 4, 1875.

The new year opens with a confusion of the elements which it is to be hoped is by no means indicative of the condition of trade for the coming twelvemonth. The frightfully inclement weather which has ruled here for the past few days has, in a great measure, lessened the usual holiday enjoyment, and, to a certain extent, interfered with new business arrangements which would have otherwise been entered upon. The feature of discussion is the condition of the coal trade, and the present suspension of business, with the prospect of a continued strike throughout the whole Anthracite region of Pennsylvania. The new basis for miners' wages for 1875 is officially announced to-day so far. The Pottsville and Schuylkill region is concerned in the following circular, in which both the Philadelphia and Reading Coal and Iron Company, and the individual operators are joined, viz:

PHILADELPHIA, Dec. 31, 1874.—Rates of wages for 1875 adopted by the Executive Committee of the Schuylkill County Exchange.—Outside wages, first-class, \$1.50 per day; second-class, \$1.35 per day; all other outside labor to be reduced ten per cent., and all outside labor to be specific, i. e., not upon a basis, and with no sliding scale.

All inside work to be on a basis system.—Basis, \$2.50 for coal at Port Carbon, only white ash collieries to be drawn. Inside labor and miners' wages to be reduced ten per cent. from the present prices. Contract work to be reduced twenty per cent.; one per cent. on inside work to be paid for every three cents advance in the price of coal at Port Carbon above \$2.50, and one per cent. to be deducted for every decrease of three cents below \$2.50. No maximum or no minimum.

ALBERT B. ECKLEY, Sec'y.

On the 24th instant a conference was held between the representatives of the Schuylkill Coal Exchange and a committee of the Miner's Association, at which the above schedule was submitted, and, after discussion by all parties, was rejected by the Miners and Laborers Benevolent Association. Work is suspended both at all the collieries and on the improvements of the Coal and Iron Company until the wages question is settled. The officers of the Miner's Association deprecate a strike, it is said, but from the action of this committee it would seem that the men are determined for the present, at least, to resist any reduction of wages. Such is the situation, and it must be confessed that, as it stands, the prospect is by no means encouraging for any parties concerned, and least of all to the consumer. To the furnace owner, now likely to be offered contracts for the product of his works at the low prices current, any uncertainty in the price of any element of cost will be necessarily fatal to negotiations, and this after the period of depression through which the trade has passed in 1874, is most unfortunate. Against this state of affairs it is, however, gratifying to be able to note the resumption of industry at several important points. The Pennsylvania Railroad Company have resumed work on full time in the extensive shops at Altoona, at which for the past six months they have been only working eight hours a day for five days in the week. At Pottsville, also, the puddlers employed in the rail mill of Atkins Bros., who have been on strike for a long time against a reduction of wages, resumed work to-day at a compromise, the rates to be paid being the same as those current at Allentown, Bethlehem and Harrisburg. In this city it is reported that the puddlers, idle at several mills here and in the vicinity, have offered to resume at prices which they previously refused, but that their offer is now rejected. I am, however, informed from the best authority in the trade here, that there is a better inquiry for manufactured iron, and that some considerable transactions have been effected at prices which are generally kept secret. Relative to the condition of the rail trade in New York, a matter which it has been apparently an effort on the part of some to depress for some weeks or months, I am in receipt of a private letter which I am permitted to quote from, and which comes from a source entitled to entire credibility, and which it will be seen takes a very hopeful view of the future from present transactions, viz:

"Regarding our market for rails, I would say that there have been, within a day or two, transactions very quietly conducted, which are likely to have a marked influence upon prices in the immediate future. The market has been largely sales on the spot to Canada buyers, which have cleared our market of English iron, excepting a small quantity of ordinary quality, and a lot of 'Extra,' which is firmly held for cash only. That such shrewd buyers as the Canadians are known to be, should purchase now and hold through the winter at a considerable cost for warehouse expenses and interest, indicates that they are satisfied bottom prices have been reached. With no appreciable stock of English rails here, it is presumable that any revival of demand will materially affect prices and send them strongly higher. I cannot see, therefore, why we may not soon have a demand from rail-ways that are running very low, on 'bare poles,' and from those who have contracts for building roads." As the opinion of a leading member of the trade, the foregoing expressions are well worth attention.

With the opening of the year we have inaugurated for a new term the Mayor who will have the honor of being the chief magistrate of our city during the Centennial Exposition. In his inaugural address he contributed the following tersely expressed account of the condition of the Centennial work, which I quote as reliable in every respect, and of interest to those who have our exhibition at heart.

"The work of preparation for the Centennial Exposition, to be held in our city, is progressing very satisfactorily, and on every side the interest appears to be increasing and its success to become more assured. On the grounds set apart for the exhibition all is bustle and activity, and the work on the buildings is well under way. The formal breaking of ground took place on the 4th day of last July, and actual work commenced on the 8th, and the first stone was laid on the 28th of the same month. The amount of progress made since then is surprising; all the grading, involving the moving of 97,000 cubic yards of earth, has been finished; the entire base of the memorial hall is levelled up to the first floor, including all the granite work, and the iron beams for the floor in place, and on the front the granite work is up to a height of twelve feet above the floor. The brick work of the inner walls is up ready to receive the iron girders for the dome, and the rear walls for the roof girders, a height of some forty feet; the piers for the main or temporary building are about completed. To give some idea of the magnitude of the work already accomplished, about 450 men have been continuously employed, and there has entered into the construction of the edifice 3,400,000 brick, 14,545 perches of stone, and 624,200 pounds of iron; and there has been received from the granite quarries scattered from Maine to Virginia, and in which 1100 more men are employed, 27,708 cubic feet of granite, two-

thirds of which is in position. The iron work for the temporary building is nearly completed, and its delivery on the ground will be commenced early in the present month; materials of all kinds are being received and stored in large quantities, to be ready for active operations as the season advances.

"A foundry is being built for casting the stationary, some of which will be of very large size. There is no doubt that the manner in which the work is progressing, that the contractor for the buildings will perform his obligations, and have them ready for occupancy at the appointed time. It therefore behooves us to perform our part as well, and use our best endeavors to contribute to the success of the undertaking, and make the Centennial Exposition a triumphant and fitting celebration of the Anniversary of American Independence."

The Value of Foreign Coins.

The following circular has been issued from the Treasury Department:

TREASURY DEPARTMENT,
WASHINGTON, D. C., Jan. 1, 1875.
The first section of the act of March 3, 1873, provides that the value of foreign coin, as expressed in the money of account of the United States, shall be that of the pure metal of such coin of standard value, and that "the values of the standard coins in circulation of the various nations of the world shall be estimated annually by the Director of the Mint, and be proclaimed on the first day of January by the Secretary of the Treasury." The estimate of values contained in the following table has been made by the Director of the Mint, and is hereby proclaimed in compliance with the above stated provisions of law:

Country.	Monetary Unit.	Standard.	Value in U. S. Money.
Argentina Republic.	Peso fuerte.	Gold.	1.00
Austria.	Florin.	Silver.	.458
Belgium.	Franc.	Gold & silv.	.193
Bolivia.	Dollar.	Gold & silv.	.965
Brazil.	Milreis of 1000 reis.	Gold.	.545
Brit. Pos. in N. America.	Dollar.	Gold.	1.00
Bogota.	Peso.	Gold.	.912
Central Amer.	Dollar.	Silver.	.918
Chile.	Peso.	Gold.	.912
Cuba.	Peso.	Gold.	.925
Denmark.	Crown.	Gold.	.968
Ecuador.	Dollar.	Silver.	.918
Egypt.	Pound of 100 piasters.	Gold.	.4974
France.	Franc.	Gold & silv.	.193
Great Britain.	Pound sterling.	Gold.	.4865
Greece.	Drachma.	Gold & silv.	.193
German Empire.	Mark.	Gold.	.918
Haiti.	Dollar.	Silver.	.952
Japan.	Yen.	Gold.	.997
India.	Rupree of 16 annas.	Silver.	.436
Italy.	Lira.	Gold & silv.	.193
Liberia.	Dollar.	Gold.	1.00
Mexico.	Dollar.	Silver.	.998
Neth. lands.	Guilder.	Silver.	.985
Norway.	Krone.	Gold.	.969
Paraguay.	Peso.	Gold.	1.00
Peru.	Dollar.	Silver.	.918
Porto Rico.	Peso.	Gold.	.925
Portugal.	Milreis of 1000 reis.	Gold.	1.084
Russia.	Rouble of 100 copecks.	Silver.	1.00
S'wedish Isl'nd.	Dollar.	Gold.	.913
Spain.	Peseta of 100 centimes.	Gold & silv.	.268
Sweden.	Krona.	Gold.	.913
Switzerland.	Franc.	Gold & silv.	.929
Tripoli.	Mahab of 30 piasters.	Silver.	.118
Tunis.	Plaster of 16 caroubes.	Silver.	.943
Turkey.	Plaster.	Gold.	.913
U. S. of Colum.	Pease.	Silver.	.949
Uruguay.	Patacon.	Gold.	1.00

B. H. BRISTOW,
Secretary of the Treasury.

The following are the rates of wages authorized by the United Sons of Vulcan, for boiling iron: First district—Pittsburg, Leechburg, Johnstown, and Apollo, \$8 per ton. Second—Wheeling, Steubenville, Ironton, Irondale, Columbus, Zanesville, and Cleveland, \$6.25. Third—Covington, Newport, Portsmouth, Cincinnati, Louisville, Indianapolis, Belleville, St. Louis, and Terre Haute, \$6.50. Fourth—Chicago, Joliet, Milwaukee, Wyandotte, and Springfield, \$7; New York, Buffalo, and Niagara Falls Forge, \$5.75; Newark, \$5.25. Fifth—Troy (six heats per ton), \$4.80; boiling iron (five heats), \$5.25; Patterson, N. J., \$5.75; Oxford Furnace, \$5.00; Phoenixville, Pa., \$5.55; Allentown (Glen Mill), \$5.25. Eastern Pennsylvania and New Jersey are ruled by Philadelphia prices (helper paid 50 cents per ton from office), \$5.25. For puddling, the rail mill rates are as follows: Baltimore, \$5.05 and \$5.89 per ton; Allentown, \$4.50; South Bethlehem, \$5 and \$5.50; Phoenixville, \$4.75; Johnstown, \$5.08; Reading, \$5; Pittsburg, \$6; Cumberland, Md., \$5.05; Columbus and Cleveland, \$6.25 and \$6; Joliet and Chicago, \$7 and \$6.55; Elmira, N. Y., \$4.75. All other points the rate for puddling averages \$1 less than that for boiling. Under the rule the rate increases as does the price for iron. The average wages for rollers is regulated by prices of sale, ranging from \$1.20 when the card rate is \$5.8-10, to 75 cents when it is \$3-10. Nail plate rolling is 10 per cent. less than bar rolling.

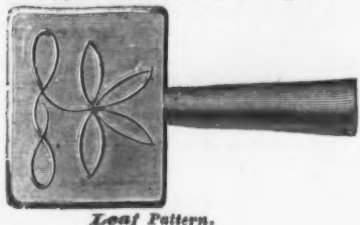
It is stated that the savings banks in Massachusetts do not show for the year 1874 any marked diminution in total deposits, though there is a marked increase of withdrawals on prior deposits. But the depositors are changed in their classes. Heretofore the wages class have been depositors to the extent of one-third the total. The salary class usually deposit to the amount of one-half the balance. The other comes from professional persons, those who use the banks as a speculative medium, and small trust funds. The wages depositors have largely decreased, the salaried also; the others have increased.

In Worcester, Mass., several machine shops have commenced running from half to three-quarter time. Quite a number of the small shops, which were closed, have commenced work. This is especially the case with the machinists' tool makers.

The Mount Carbon (Pa.) Mills have started up again with fifteen furnaces, and orders sufficient to employ a full force through the winter.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



Leaf Pattern.

King Bolt Yokes.



Established 1850.

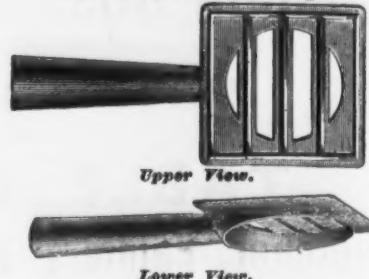
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



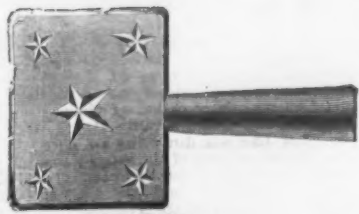
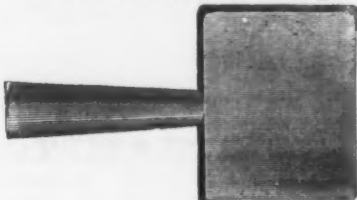
Patent Cross Bar Steps.



Upper View.

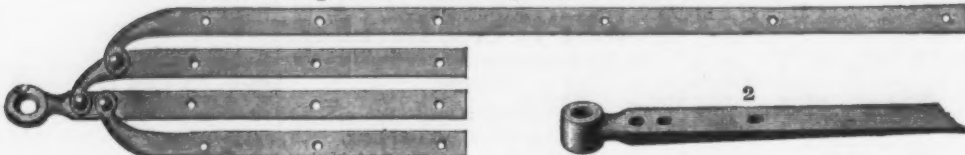
Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



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House Pullies, Composition Cocks, Bench Screws, Vise Screws
Gridirons, Drill Stocks and Boxes, Box Chisels, Rivets,
Sheaves, Block Pins, Composition Roller and Iron Bushings,
Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying
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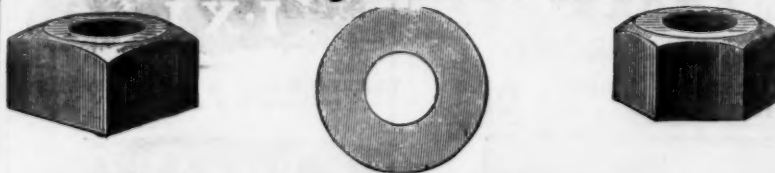
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Bolt is made from approved brands of Iron, and is equal in every
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AND LENGTHS - - $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$ INCH.

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AMERICAN BOLT COMPANY,

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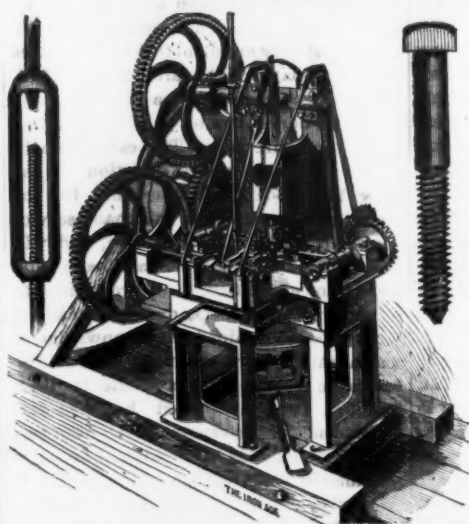
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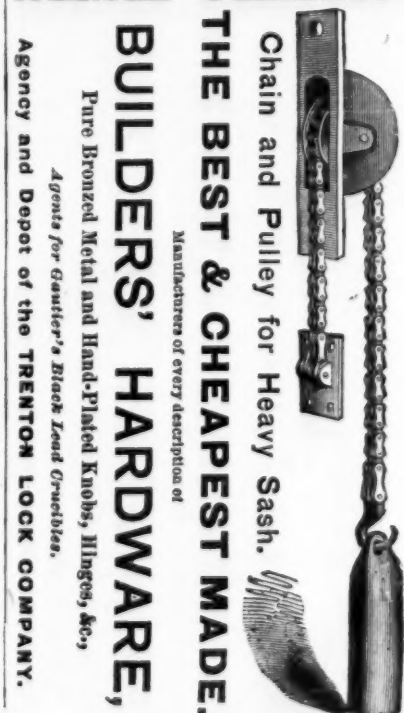
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The Iron Age.

New York, Thursday, January 7, 1875.

DAVID WILLIAMS - Publisher and Proprietor.
JAMES C. BAYLES - Editor.
JOHN S. KING - Business Manager.

New York, January 2, 1875.

Until the 1st instant the postage on new-papers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents. Under the provisions of the new postal law, which went into effect on the 1st instant, payment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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The subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

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Technical Education.

There is evidently a growing interest in this country in the subject of technical education. In many trades in which the theoretical knowledge has hitherto been held of little account compared with practical experience, the idea is steadily gaining ground that theory and practice must go together to insure the attainment of the fullest measure of success. The chemist, the physicist, the civil and mechanical engineer, the scientific metallurgist, all find opening before them a wider field of usefulness, as manufacturers in one trade after another call upon them for advice and assistance in perfecting methods and processes now in use, or in devising others which shall be better and more economical. Scientific men are no longer regarded by "practical men" as mere theorists, from whom nothing useful can be learned which is worth a consultation fee. The practical men have learned from experience that

there is something in theory when reduced to a practical application, and that a judicious expenditure of money in scientific investigation and experiment is always a good investment. The next step, which many have already taken, is to give their sons educational advantages which they did not have themselves, by sending them to one of the few technical schools of this country, or one of the many and excellent institutions of this kind in Europe. The next step, let us hope, will be the development of a strong public sentiment in favor of extending the advantages of technical education to the classes in this country which cannot afford to go abroad, or to pay much for tuition at home—the classes from which our intelligent native-born mechanics are drawn. To do this would be to insure to the country the fullest measure of future prosperity. We have varied natural resources, capable of sustaining as great an annual production of useful commodities as any other country of the world, our inventors are ingenious and practical, our working classes, recruited by the immigration of young and ambitious men from abroad, tempted hither by higher wages and larger opportunities, compare more than favorably with those of other countries, and we have enough of both capital and enterprise to carry on great manufacturing industries. With these advantages, another generation should build up a vast industrial prosperity upon the foundations already laid, and if, in the education of that generation, we combine the learning of the school with the practical instruction of the workshop and factory, the progress of the next half century will be greater and more rapid than that which the country has witnessed during the past fifty years. It will not do, however, to rely too much upon natural advantages, or to neglect any of the means which experience has shown to be best calculated to render a people capable of making the most rapid progress in the application of the practical arts and sciences which internal resources or external circumstances may render possible. Among these means none are more certain to accomplish important results than abundant facilities for technical instruction. In the lack of such facilities our educational system is essentially defective. In a country which aspires to industrial pre-eminence, brains must stand at the loom and intelligence at the work bench. The practical education of shop and factory is of the utmost importance so far as it goes, but it does not give the average mechanic a knowledge of his trade. No man is a good mechanic who is not fitted to become a master, and no one can become a successful master who does not know the theory as well as the practice of his trade.

The technical schools of Continental Europe have contributed, more than any thing else, to the rapid progress of this and nearly all other countries in devising means for supplying the varied and ever increasing wants of humanity. In France, for example, there is scarcely a manufacturing town of any importance which has not its art school, where whoever will may learn the principles of design upon the payment of a merely nominal fee, and to this fact may be attributed, in great part, the taste and ingenuity of French mechanics. But even with her numerous and useful schools of designs, France is as much below Germany in the matter of technical education as she is above England or the United States, for even in the smallest and most insignificant of the German provinces, as well as in Prussia and the larger States, there is a system of technical education so perfect and thorough that it is difficult to suggest a means of improving it in any essential particular. This system is too vast to be sketched, even in outline, but one State will serve as a sample of the whole. In Wurtemberg, for example, a province with a total population of only 2,000,000, the educational system provides the following institutions: As many elementary schools as there are communes or parishes, at which all children between the ages of six and twelve may acquire the rudimentary branches; 450 primary industrial schools, attended chiefly by girls; 523 farming and trade schools, at which lads of twelve and upward are fitted for husbandry and handicrafts, in morning or evening classes; 76 industrial academies, in which pupils are taught the elements of applied sciences; a great agricultural college at Hohenheim, and a great building-trades college at Stuttgart—the one for giving thorough practical and scientific education to farmers and gardeners; the other, under the control of one of the first architects of Germany, assisted by twenty-eight able professors, for fitting journeymen masons, carpenters, bricklayers and architects' assistants to become foremen and masters in their respective crafts; finally, a polytechnic university in Stuttgart, amply equipped with lecture rooms, modeling rooms, chemical and physical laboratories, a mineralogical museum, a botanic garden, and an

astronomical observatory, where matriculated students may go through complete courses of mathematics, natural philosophy and natural history, engineering, etc., on payment of less than \$20 for the half-year, and where whoever chooses may attend the classes of any of the 51 professors upon payment of a fee equal to about five cents per lesson. From this brief outline of the educational system of Wurtemberg, we may form an idea of the educational system of all Germany, Wurtemberg being behind some of the States and ahead of others in this respect. But admirable as is the German system, that of Switzerland is far superior, the Swiss having gone ahead of all other peoples in combining instruction in the practical arts with instruction in abstract science. The Swiss, as a people, are proverbially frugal, even to parsimony, but toward these and certain other important public objects their liberality is remarkable, and the Polytechnicon of Zurich is, perhaps, the most perfect, as well as the most extensive, technical school of Europe. Belgium and Austria also have public systems of technical education which are more or less perfect, and in Great Britain there has been considerable progress in the same direction during the past few years.

It is useless to expect that, even if the importance of free technical education were fully appreciated in this country, we could in many years establish a system of public instruction as perfect, in proportion to our population, as those of Continental Europe. But we can easily make a beginning in this direction which shall prepare the way for a rapid and sustained progress. Nearly all that has been done in this direction has been accomplished by private philanthropy, and we already have a number of very excellent technical colleges and schools, which are always full. There has also been some attempt made to extend our system of public instruction in the same direction. The establishment of a school ship under direction of the New York Board of Education, for the training of boys for the merchant service is a step in the right direction, and will turn out sailors who understand navigation and who are fitted for promotion to responsible commands, over the heads of those who have gained their knowledge of seamanship before the mast and in the forecastle. We also have the institute founded and maintained by the wise benevolence of the venerable Peter Cooper, whose example has been imitated by a few rich men in other cities, though rarely, if ever, with results so completely satisfactory. But we have no system of technical instruction in this country adapted to the wants of the people at large. How this want can best and most quickly be met, without detriment to our existing public school system, is a question which we think should receive the attention of those who make educational problems a study. There is nothing impracticable in the idea of a system of scientific and technical instruction which shall be practically free to all who wish to avail themselves of the facilities offered. Great polytechnic schools, like those of Europe, are not to be looked for as the first fruits of a movement in this direction. Let us first have free evening classes and lectures in suitable buildings, to which young mechanics are invited. Under the charge of competent professors these classes would accomplish great good, and out of such a beginning would soon grow a system of public instruction well calculated to elevate the standard of intelligence among our working classes, and encourage a taste for reading and study on the part of young men who can be made to appreciate the advantages of education in no other way. The great work accomplished by the free classes of the Cooper Union, in this city, always full, shows that such a system as we have suggested would not fail for want of public appreciation.

Patents and Trade Marks in Germany.
We have received from Messrs. Wirth & Co., of Frankfurt-on-the-Main, an interesting communication on the subject of the patenting of foreign inventions and the registering of foreign trade marks in Germany, which contains information of interest to our readers. They state that much of the difficulty experienced by foreign inventors in securing German patents is due to the fact that they neglect to make application until patents are unobtainable under the law. This has given rise to the belief that German patents are rarely granted. In Prussia this is generally the case with regard to foreign inventions, for the reason that applications are not made until after the publication of foreign patents. In Prussia, as well as in France, valid patents cannot be obtained when the specifications of an invention have been previously published in another country, but for all inventions which are not previously known to the public, patents are

readily granted. It is, therefore, necessary that American inventors should apply for German patents before American patents have been printed.

Another very common mistake is that no German patents are of value if one has been refused by Prussia. Germany has a population of fifteen millions outside of Prussia; all the larger States have well organized patent systems, and patents issued by them are valuable in proportion to the utility of the invention patented and its adaptation to the German market. These are facts of interest to American inventors who have any hope of securing protection in Germany.

We also have an abstract of the law of November 30, 1874, relative to the registration of trade marks in Germany. This law provides that the registration of trade marks which have been in use previous to 1875 cannot be refused, if suitable for registration under the existing law. The registration is made in the name under which the applicant does business. If the applicant changes his business address the trade mark must be registered over again, with the date of the first registration stated. Registration can be cancelled by the person or firm claiming the trade mark, or by the government under certain conditions which need not here be specified. The government charge for the first registration of a trade mark is fifty Reichsmark (about \$12, gold); subsequent registrations are made without charge. Names or devices which have ever been common property cannot be registered. Alterations made in a trade mark which do not change its character, and which are not readily seen, do not invalidate the registration. Foreigners have all the rights of citizens in securing protection for trade marks, if German trade marks are also protected in their country, but the foreign mark must be entered in the register of the empire, the proprietor must "take domicile on the seat of the German Tribunal of Commerce," he must show that his mark is entitled to registration in his own country, and that the duration of the German protection shall not be longer than that granted him at home. The new law goes into operation on the 1st of May, 1875. Trade marks already registered under the existing law will be protected until October 1, but they must then be registered again.

Metal Imports at New York in 1874.

The following is a statement of the importations of metals and manufactures of metals at the port of New York during the calendar year 1874. The quantity, when not otherwise specified, is given in packages:

	Quantity.	Value.
Anvils.....	3,258	\$64,127
Brass goods.....	794	103,296
Bismuth.....	15	7,834
Bronzes.....	5,548	287,769
Chains and anchors.....	4,805	223,974
Copper.....	4,678	143,461
Copper ore.....	127	5,286
Cutlery.....	4,671	1,712,996
Gas fixtures.....	19	6,224
Gun barrels.....	4,678	271,743
Gun barrel molds.....	877	28,233
Hardware.....	3,465	370,530
Iron ore.....	3,085	16,499
Iron, hoop.....	37	3,892
Iron, pig.....	32,841	936,561
Iron of R. Bars.....	338,945	5,099,005
Iron, sheet.....	2,927	518,811
Iron, other.....	15,306	838,888
Iron tubes.....	2,588	4,196
Iron cotton ties.....	32,699	92,938
Lead, pigs.....	213,147	1,338,935
Lead, fuses.....	4	413
Lead, other.....	8,697	960,090
Nails.....	553	26,904
Needles.....	678	340,601
Nickel.....	8	6,301
Old metal.....	121	101,751
Plated ware.....	121	11,560
Platina.....	57	151,039
Percussion caps.....	492	92,587
Saddlery.....	328	63,920
Steel.....	118,983	1,538,227
Spelter, lbs.....	2,467,841	122,691
Silverware.....	103	19,508
Silver ore, tons.....	309	25,625
Tin, bbls.....	8,182	87,027
Tin plates, boxes.....	1,013,342	8,317,728
Tin slabs, lbs.....	10,085,015	2,369,100
Wire.....	15,471	217,518
Zinc, lbs.....	4,404,037	273,859

The following comparison of the value of the importation of some of the principal items in the above table, for the four calendar years ended with 1874, is interesting:

	1871.	1872.	1873.	1874.
Iron, bars.....	3,970,193	5,125,094	2,981,635	638,888
Iron, pig.....	1,593,728	2,940,810	2,947,848	936,561
Iron, R. R.....	10,115,973	9,455,519	9,061,553	5,099,005
Iron, other.....	261,128	286,518	567,026	518,811
Lead.....	2,940,582	2,187,201	1,770,736	1,338,935
Spelter.....	865,867	473,303	306,910	122,691
Steel.....	2,613,228	2,771,794	2,466,276	1,538,227
Tin and tin plates.....	8,587,042	10,561,611	10,885,775	10,676,885
Zinc.....	245,765	546,333	907,080	272,258

The death of Capt. E. B. Ward, of Detroit, a sketch of whose life is given in another column, deprives the iron trade of one of its most enterprising and successful representatives in the West. Captain Ward was one of those self-made men who achieve conspicuous success by indomitable perseverance and untiring energy. Beginning life as a cabin boy on a lake packet, he worked his way steadily upward until he owned and managed a large fleet of lake vessels and had become one of the largest capitalists of the Northwest. Appreciating the importance of building up the manufacturing industries of that section, he employed his large means in organizing and establishing iron works, glass factories, saw mills, etc.

Few men have wielded a larger influence in Western business circles than Captain Ward, and few have conferred equal benefit upon the sections included within the range of their operations.

The "Subtle Principle" Again.

We have received a curious document during the past week, accompanied by an anonymous letter bearing the great red seal of somebody who calls himself the "National Currency League." The document purports to be a declaration of principles, and sets forth in familiar language the claims of an old scheme which is commonly known as "the 3-65 bill." Looking over the "declaration of principles" we find the various stereotyped phrases which have been paraded so persistently before the public notice for years past in support of this measure. Few who are interested in financial matters are so obtuse that they have not laughed over the oft repeated and meaningless platitudes which proclaim that, in the proposed interchangeability of currency and 3-65 per cent. government bonds, at the option of the holder, there is "a subtle principle which regulates the volume of currency as accurately as the governor regulates the movements of a steam engine;" that "the use of gold and silver as a circulating medium is a barbarism unworthy of the age;" and that it is the duty of the government to borrow on call all the money in the country not otherwise profitably employed, and pay interest on it until it is wanted again for speculative purposes. This arrangement would be very pleasant for the banks and the money lenders, who could thus keep the rate of interest on call loans from ever going below 3-65 per cent., but no one else has yet discovered any good reason why the government should pay interest on the unemployed money balances of the country, merely for the privilege of locking up legal tenders in Sub-Treasury vaults for a day or a week. But the "subtle principle" is a financial Frankenstein that will not "down" at the bidding of common sense or public opinion, and the gentleman who calls himself the "National Currency League" is about to organize himself as a secret society by signing the following "Preliminary Pledge."

We the undersigned—with occupations designated in connection with our respective signatures—hereby solemnly declare upon our sacred honors, that we fully and cordially endorse the foregoing declaration of principles of the National Currency League, and promise to promulgate those principles to the end that they may become as widely understood as possible. And believing that the issue of legal tender notes as therein described is a matter of such vital importance to the country that it ought to form an issue of paramount interest in the next presidential election (if not ordered by Congress prior to that time), we further promise, unless some unexpected and *really* important matter should in the meantime arise, to use our influence in favor of such candidates for the suffrages of the people as shall boldly and emphatically declare in favor of a perfected greenback currency. We also promise not to admit any person to be present at our meetings unless they have signed a pledge not to divulge any of the proceedings of the auxiliary division of which we are members, except to members in good standing of our own division, nor divulge the substance even of any communication received from the central division—neither will we make, or sanction, any public announcement of the time or place of the meetings of this auxiliary division of the National Currency League, whose post office address is legally written hereon.

AUXILIARY DIVISION—NATIONAL CURRENCY LEAGUE.
at _____ (P. O.)—County, _____—State.
Signature _____ Occupation _____.

This is something new and original, notwithstanding the fact that it calls to mind the "declaration of principles" made by the three tailors of Tooley Street, which began, "we, the people of Great Britain, &c." Without doing violence to the facts of the case, we may call this a secret conspiracy to reform the financial system of the country by dark and mysterious means. As the rule, reformers and theorists endeavor to make the proceedings of their meetings as public as possible; in this case only members pledged to secrecy are to be admitted to the meetings, which are to be held no one knows where. We don't really suppose it makes much difference whether the gentleman composing the National Currency League meets secretly or publicly: whether he walks into convention with himself by day light, or skulks in by night, whispering pass words and making signs to supposititious sentries and imaginary tylers. If he derives any amusement from the sweet consciousness that he is a financial Ku Klux, as it were, no one will object; but the idea is novel, to say the least.

The iron industries of Massachusetts are greatly depressed. About 15,000 operatives are usually employed, of whom less than one-half are now fully occupied. The average wages for skilled machinists and others employed in the machine shops and foundries is about \$13 per week. The depression has continued for about two months. The total loss in wages is calculated at about \$600,000, estimating the whole number of unemployed for that period at 6000 persons.

AMERICAN PIG AND BAR IRON.

Average cost of pig iron on furnace bank, and of merchant bar in mill, from 1850 to 1874, inclusive. Compiled for *The Iron Age*, from original data, by Mr. Wm. E. S. Baker, Secretary of the Eastern Iron Masters Association.

AVERAGE COST OF PIG IRON, 1850 TO 1874.

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1874
Cost of Ore to the ton of Pig Iron.....	5 75	5 44	5 55	5 97	6 65	7 51	7 50	7 75	7 66	7 08	7 45	7 35	7 08	7 49	9 12	13 13	13 19	11 71	10 92	11 85	12 96	12 67	13 64	14 87	14 75	11 13
Cost of Coal to the ton of Pig Iron.....	3 70	3 36	3 65	3 23	3 53	4 63	3 90	3 80	4 06	3 26	3 49	3 26	3 68	3 42	5 41	9 66	7 55	7 44	7 11	7 41	7 08	8 50	7 28	7 45	7 90	7 08
Cost of Limestone to the ton of Pig Iron.....	93	96	1 00	1 06	1 38	1 36	1 16	1 14	1 18	1 15	1 21	1 17	1 11	1 20	1 83	85	2 65	2 76	2 51	2 14	2 44	2 08	2 04	1 98	2 03	1 60
Cost of Labor to the ton of Pig Iron.....	2 22	1 61	2 02	2 00	2 45	2 85	2 58	2 30	2 10	1 82	1 87	1 97	1 57	2 07	2 85	4 56	3 46	3 99	3 86	3 46	3 89	3 54	4 69	5	4 40	2 90
Cost of General Contingencies.....	1 65	1 93	2 03	2 62	1 99	2 62	2 91	2 16	2 73	2 88	2 83	2 86	2 67	2 35	1 66	2 01	2 03	1 93	1 90	1 96	3 67	2 77	2 93	3 00	2 39	2 12
Cost at Furnace Bank.....	14 25	13 30	14 34	14 88	16 00	18 87	18 05	17 24	17 73	16 14	16 85	16 61	16 11	16 53	30 97	32 21	27 88	27 88	26 30	26 83	30 04	29 65	30 58	32 41	31 47	25 79
Add interest on capital on a product of 6000 tons.....	1 05	1 05	1 15	1 22	1 37	1 29	1 21	1 47	1 22	1 28	1 36	1 57	1 57	1 40	1 39	1 61	1 64	1 80	1 63	1 71	1 85	1 83	75	2 03	2 00	1 80
Total cost to the producer.....	15 30	14 35	15 49	16 10	17 37	20 16	19 26	18 71	18 95	17 42	18 21	18 18	17 68	17 93	32 36	33 82	29 53	29 68	27 93	28 54	31 89	31 47	32 33	34 49	33 47	27 50

AVERAGE COST OF BAR IRON, 1850 TO 1874.

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1874
Cost of Pig Iron to the ton of Finished Bar Iron.....	25 65	24 90	25 71	25 25	24 17	24 64	23 84	23 34	23 61	25 54	25 61	25 35	24 36	27 90	41 40	68 60	50 77	50 64	44 53	43 29	43 63	40 52	49	43 24	4 20	31 69
Cost of Coal to the ton of Finished Bar Iron.....	5 70	5 61	5 61	5 81	6 00	8 28	6 59	6 00	5 49	5 17	5 27	5 30	6 19	7 66	8 44	3 03	8 92	9 13	8 64	8 33	8 55	7 55	8 43	8 55	8 46	6 98
Cost of Labor to the ton of Finished Bar Iron.....	0 43	0 17	0 37	7 05	15 12	14 70	12 85	13 06	7 70	6 08	0 90	1 12	11 78	5 4	8 94	37 45	20 61	22 02	19 87	20 65	8 57	7 70	21 55	30 37	9 02	14 37
General Contingencies.....	4 64	4 83	4 88	0	10 30	10 78	8 88	10 38	10 84	7 91	8 78	8 71	10 03	7 66	9 5	8 03	50	9 44	7 70	7 75	7 08	7 85	5 74	5 83	5 29	6 15
Cost in the Mill, finished.....	46 42	45 51	46 57	49 17	73 68	76 40	61 16	62 78	58 71	50 30	50 56	50 57	52 36	58 36	77 93	127 11	91 80	9 23	80 74	80 02	77 78	73 62	84 83	77 99	73 97	59 19
Add interest on capital on a product of 6000 tons.....	9 56	1 49	1 54	1 50	1 80	1 63	1 59	1 89	1 65	1 60	71	90	75	1 77	80	2 80	2 0	2 05	96	2 09	3 15	3 30	2 22	2 35	2 10	1 74
Total cost to the manufacturer.....	47 98	47 00	48 11	50 67	75 48	78 06	62 75	64 67	60 36	51 90	52 27	52 47	54 11	60 13	79 73	129 91	93 81	93 28	82 70	82	79 93	75 83	87 05	80 24	76 07	60 93

Quantity of Ore used to make 1 ton of Pig Iron, average of 30 years.....tons, 2.17-0.22
 Quantity of Coal used to make 1 ton of Pig Iron, average of 30 years....." 2.00-0.35
 Quantity of Limestone used to make 1 ton of Pig Iron, average of 30 years....." 1.04-0.25
 The above group of furnaces used Juniata and Montour Hematite Ores, and a little Cornwall. The coal came chiefly from the Wyoming and Lehigh Valleys.

Quantity of Pig Iron used to make 1 ton of Finished Bar Iron, average of 16 years.....ton, 1.05-2.00
 Quantity of Coal used to make 1 ton of Finished Bar Iron, average of 16 years....." 1.16-2.19
 The above rolling mills used Gray and White Pig Iron and Broadtop and Cumberland Coal.

Scientific and Technical Notes.

We find in *Deut. Illust. Zeitung* a method for COATING IRON WITH COPPER,

so as to protect the former from the action of sea-water and the like. The iron is cleaned and rendered perfectly bright by means of acid, and then immersed in a bath of melted copper, which is maintained at a very high temperature, so that it not only covers the iron but becomes incorporated with it. Iron covered in this way can be hammered and rolled without the copper tearing or peeling off. Specimens left in contact with sea water for nine months was unattacked and could be hammered and rolled out like new metal. Iron plates covered with copper in this way have two advantages over pure copper plates, namely, they cost less and are harder and stronger. There is also a great advantage in using coppered iron wire for telegraph lines, instead of galvanized iron.

In another number of the same journal we find the following method described for

COVERING IRON WIRE WITH BRASS without a battery: The process is a very simple one, and consists first in placing the clean, bright wire in a solution of sulphates of copper, when it immediately becomes covered with a thin film of copper. It is then covered with a paste of pure oxide of tin, and heated to a temperature high enough to fuse the copper. Care must, of course, be taken to prevent the volatilization of the tin.

In this connection we might also refer to Dr. Heeren's process for

GIVING TO IRON WIRE A SILVER WHITE APPEARANCE

by means of a thin film of tin. The iron wire is first placed in hydrochloric acid, in which is suspended a piece of zinc. It is afterward placed in contact with a strip of zinc, a bath of two parts tartaric acid dissolved in 100 parts of water, to which is added three parts tin salt and three parts soda. The wire remains about two hours in the bath, and is then made bright by polishing or drawing through a drawing iron. By this galvanic tinning, wire which has been wound in a spiral, or iron of other shape, can be made white, which is an advantage over other methods where the wire is tinned in the fire and drawn through a drawing plate.

Dr. Sauerwein recommends the following method for

PRODUCING A BROWN COLOR ON IRON.

The iron vessels to be covered are moistened with dilute nitric acid and allowed to dry, when the operation is repeated until the oxide film acquires the desired appearance. The vessel is then diligently rubbed with linseed oil varnish. The articles then possess a beautiful red-brown color, and are protected from further oxidation. Equally good results are obtained, but in another color, by dissolving two parts sesquichloride of iron, two parts butter of antimony, and one part gallic acid, dissolved in the least possible quantity of water, and rubbing the vessel with it. The operation may be repeated as often as desired, and then rubbed with linseed varnish.

MOLECULAR CHANGES IN WROUGHT IRON.

It is generally known that the texture of wrought iron suffers a change by being subjected to a series of concussions, and passes from the fibrous to the crystalline state. It may not be so well known that a similar change takes place, on the surface at least, when fibrous wrought iron is heated and then suddenly cooled. Prof. Kick heated some of the best boiler plate in a muffle furnace, almost but not quite to a red heat, and then chilled it. On breaking, it was found that the outside portions were crystalline to a thickness of one millimeter. With thin plates this would produce great weakness.

The coal operators of Cleveland, Massillon, Fulton, and their vicinity in Ohio, have agreed that a reduction of twenty cents per ton in the cost of mining is necessary. No fear of a strike is felt.

Monthly Quotations of Pig Iron, at New York, per Ton, from January, 1825, to December, 1869.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1825.....	35.00 @ 50.00	35.00 @ 50.00	35.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	75.00 @	75.00 @	75.00 @	70.00 @ 72.50	70.00 @	70.00 @
1826.....	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00
1827.....	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00
1828.....	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	52.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00
1829.....	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00
1830.....	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00	40.00 @ 50.00
1831.....	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00
1832.....	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50	40.00 @ 47.50
1833.....	40.00 @ 45.00	40.00 @ 45.00	40.00 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00	37.50 @ 45.00
1834.....	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50
1835.....	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50	38.00 @ 42.50
1836.....	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00	60.00 @ 70.00
1837.....	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00	50.00 @ 55.00
1838.....	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00
1839.....	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00	37.00 @ 40.00
1840.....	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00	35.00 @ 40.00
1841.....	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50
1842.....	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00	34.00 @ 35.00
1843.....	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50	37.00 @ 42.50
1844.....	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00	31.00 @ 33.00
1845.....	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00
1846.....	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00
1847.....	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00	38.00 @ 40.00
1848.....	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50	35.00 @ 37.50
1849.....	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00	25.00 @ 26.00
1850.....	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00	23.00 @ 24.00
1851.....	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75	19.50 @ 20.75
1852.....	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00	30.00 @ 32.00
1853.....	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50
1854.....	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50
1855.....	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50
1856.....	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50	37.50 @ 38.50
1857.....	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00	30.00 @ 31.00
1858.....	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00	25.00 @ 27.00
1859.....	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00	25.00 @ 28.00
1860.....	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00	24.00 @ 25.00
1861.....	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00	20.00 @ 21.00
1862.....	21.00 @ 23.00	22.00 @ 24.00	23.00 @ 25.00	24.00 @ 26.00	25.00 @ 27.00	26.00 @ 28.00	27.00 @ 29.00	28.00 @ 30.00	29.00 @ 31.00	30.00 @ 32.00	31.00 @ 33.00	32.00 @ 34.00
1863.....	35.00 @ 40.00	37.00 @ 42.00	39.00 @ 44.00	41.00 @ 46.00	43.00 @ 48.00	45.00 @ 50.00	47.00 @ 52.00	49.00 @ 54.00	51.00 @ 56.00	53.00 @ 58.00	55.00 @ 60.00	57.00 @ 62.00
1864.....	43.00 @ 48.00	45.00 @ 50.00	47.00 @ 52.00	49.00 @ 54.00	51.00 @ 56.00	53.00 @ 58.00	55.00 @ 60.00	57.00 @ 62.00	59.00 @ 64.00	61.00 @ 66.00	63.00 @ 68.00	65.00 @ 70.00
1865.....	53.00 @	55.00 @	57.00 @	59.00 @	61.00 @	63.00 @	65.00 @	67.00 @	69.00 @	71.00 @	73.00 @	75.00 @
1866.....	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00	50.00 @ 52.00
1867.....	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00	45.00 @ 48.00
1868.....	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00	35.00 @ 37.00
1869.....	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00	40.00 @ 42.00

Captain Eber B. Ward, of Detroit.

We take the following from the *Detroit Tribune*, of January 3d: At about 10:45 o'clock this morning, Capt. Eber B. Ward suffered an attack of apoplexy while walking on the west side of Griswold street, and in front of the banking office of E. K. Roberts. He had sustained one severe attack of the same malady before, and it is understood that prior to that he had also experienced a slight shock of a similar character. He was at once carried into Mr. Roberts' office, and the attendance of several physicians was secured, but their efforts were all in vain. Indeed, it is probable that he was already dead within three minutes from the time when he was lifted up in the street. Intelligence of his death was, of course, at once conveyed to his family and to many men in different sections of the country, who were interested with him in business pursuits.

Eber B. Ward was born in Canada (although an American citizen) in 1811, his parents having fled to that country from Vermont during the same year to avoid the threatening consequences of the pending war. After the war of 1812 was over, Eber's parents returned with their family to the old homestead in the "Green Mountain State," where they remained until he was six years old. His home was located in the town of Wells, one of the most delightful spots in Vermont.

Not long after the "second war" had been ended the tide of emigration resumed its westward march and in 1815 Eber's parents with their family were among the travelers to the more lucrative fields of the South and West. They had set out for Kentucky, but, being delayed at Waterford, Penn., for some time, and meeting with a misfortune, in the death of Eber's mother, they changed their course and went to Ohio. After a short stay in that State, events gradually pushed them westward until they were permanently located in Michigan.

Mr. Ward, Sr., first visited Detroit in 1821. This was 16 years after the old town had been destroyed, and at a period when there was but one frame house in the town, the average buildings being of logs, with cedar bark roofs. At this time the largest vessel that floated on the lakes was only of 30 tons burden, and when one of these arrived at Detroit's solitary wharf, men, women, and children thronged the river's bank to get a glimpse of the strange visitor. At this period, and for several years afterward, the whole fleet of the lakes could not carry as much as one of the present large grain vessels. And not one which then navigated the lakes was owned by Detroit. There were but three or four then on Lake Erie, and most of them belonged to the English. A public vessel known as the brig Hunter was the only means of water communication between Detroit and Buffalo.

Mr. E. B. Ward accompanied his father to Marine City in 1822, and two years after to Mackinac, where he commenced his marine life by securing the very humble position of "cabin boy" in a small schooner. At this time he was about 13 years of age. Observing his energy and admiring his active qualities, Mr. Samuel Ward, his uncle, the leading shipbuilder of Marine City, called the youthful Eber from his sailor's life and gave him a clerkship in his warehouse. This change marked the beginning of a life of usefulness and importance. Being constantly in connection with interesting marine transactions his growing business talents were rapidly improved.

His first floating investment was a quarter interest in the General Harrison, of which he became master. He took command of this craft in 1825, and managed her successfully until his increasing interests demanded his presence at Marine City. He was subsequently admitted as a partner with his uncle in the place, where he continued a most successful business until 1850, when he withdrew his interest and came to Detroit, where a larger and less occupied field afforded him a peculiar opportunity for success. From that day until within a recent date he pushed the marine interests of Detroit forward with a giant hand. Through his timely efforts our commerce has grown and prospered, and the city's floating property nearly doubled. Although his operations are mostly known to the people of this State, the following list, showing the names of the steamers and sailing vessels he has built, will be valuable. It is impossible, however, owing to frequent changes in ownership, to give the fates of these vessels. Many of them have been lost, and some of them are still actively navigating the lakes and doing honor to their builder: General Harrison, The Champion, Samuel Ward, The Pearl, Atlantic, B. F. Wade, Montgomery, Huron, Detroit, Pacific, Ocean, The Caspin, Planet, Arctic. There are a number of smaller vessels not included in this list.

Within the last few years Mr. Ward had been gradually withdrawing from the vessel business, and investing his extensive capital in another direction. He was interested to the extent of about one million in the Chicago Rolling Mills, and half that amount in a similar corporation at Milwaukee, Wis. His stock in the Wyandotte Rolling Mill exceeds half a million, and his floating property is valued at nearly or quite this amount. He owned real estate to the amount of over two millions of dollars, and had in the neighborhood of three millions invested in different speculations. Just what the value of his property was at the time of his death it is impossible as yet to say.

Capt. Ward has been during many years a prominent member of the Republican Party, and was extensively known throughout the country. He leaves a family of five children by his first wife, all grown up, three sons and two daughters. By his second wife, who survives him, he has two children, a boy of five years old, and a girl two and a half years of age. She is now on a visit to friends in Conneaut, Ohio, and has been telegraphed to.

Capt. Ward leaves a will, made some six or eight months since, of which Messrs. E. B. Winans, of Cleveland, T. C. Owens, of Detroit, and Owen Potter, of Chicago, are executors.

An inquest was held by Coroner Cahill, and the jury found that death resulted from apoplexy.

(We hope to present a sketch of Capt. Ward's career as an ironmaster in a future issue of *The Iron Age*.)

The "universal" system of rolls, says the *Pittsburgh Commercial*, from its adaptability to roll any sizes of plate beyond the reach of the grooved rolls, has become a great favorite with the manufacturers of iron, and there are quite a number in operation in this city. Messrs. Carnegie & Klonan, it is said, have the largest and finest "Universal Mill" in the United States. This mill has an improved frictional reverse motion gearing, introduced by Mr. Klonan, and also an automatic system of rollers on a long stationary table on each side of the rolls. By this arrangement a piece of iron of three or four tons can be easily handled, so far as the rolling is concerned, as one of 3 cwt. or 4 cwt. Messrs. C. & K. have already rolled plates, with perfectly sound edges, 37 feet long, three feet wide and three-eighths inch thick, and feel confident they can go beyond this, although it is said the foregoing has never been accomplished before. The next in order of size is the Universal Mill at Grad, Bennett & Co.'s Millvale Works, operated with reversing engines, and having automatic rollers for carrying the bloom to and from the rolls. This mill is used exclusively, at present, for rolling Danks furnace blooms, weighing about 1000 pounds each, into bars for subsequent piling and rolling into plates.

Special Notices.

"Special Notice."

WANTED.—To exchange, *First-Class Improved City Property*, in the city of Philadelphia, to the amount of one hundred thousand dollars, clear of all incumbrance, for a good article of Pig Iron for same amount, to be delivered here. Address **IRON, P. O. Box 2841, Philadelphia.**

PARTNERS WANTED

More working capital needed. Grounds, Shops, Tools and Machinery, all in good working order. A rare chance for parties desirous of engaging in the manufacturing business. Correspondence solicited. Address, **D. WHITING, Ashland, O.**

Dissolution of Partnership

Notice is hereby given that the partnership heretofore existing in the name of "Jesse W. Starr & Sons," between **JESSE W. STARR, BENJAMIN A. STARR, BENJAMIN F. ARCHER, and JESSE W. STARR, Jr.** has this day been dissolved by the undersigned, three of said partners, according to the provisions of their articles of partnership.

The unsettled business of said firm will be adjusted by the undersigned.

JESSE W. STARR, BENJAMIN F. ARCHER, JESSE W. STARR, Jr.
(Signed) **Camden Iron Works, Camden, New Jersey, December 31, 1874.**

Wanted.

An experienced Hardware Salesman; a young man preferred, having trade in Pennsylvania, Maryland, and the Southwest. Address, with full particulars, experience, salary expected, and references, **HARDWARE, Herald Office, N. Y.**

A man with long experience, and acquainted with the trade, both city and country, desires a situation as city salesman, manager or general clerk in the wholesale trade. Would accept a position in a factory or in the country. The best of references given from former employers and others in the trade. Address, **C. E. R., P. O. Box 1218, New York City.**

An experienced Machinist, Engineer, and Draughtsman will invest \$10,000 in a Machine Shop and Foundry or Iron Works.

Address, **MACHINIST, Office of The Iron Age, 10 Warren St., N. Y.**

Wanted,

Two Spike makers. Must be good reliable men, and come well recommended. Also, two Feeders. Steady employment and good wages.

Address, **G. W. FAHRION, Niles, O.**

The undersigned have entered into co-partnership under the name and style of **JESSE W. STARR & SON,** and will continue the business at the Camden Iron Works, Camden, N. J., as heretofore.

JESSE W. STARR, JESSE W. STARR, JR.
CAMDEN IRON WORKS, Jan., 1, 1875.

WANTED.—A HARDWARE TRAVELER of eight years' experience, well acquainted with all large Western buyers, and who can give the best references, is open for an engagement with a manufacturer, on salary, commission, or both. Address, **W. B. S., Box 3760, P. O., N. Y.**

By an experienced man who has a large acquaintance with the wholesale and retail hardware and house furnishing merchants throughout the West, a position as traveling salesman. Can furnish good city references. Address, **P. A. C., Office of The Iron Age, 10 Warren St., N. Y.**

Merchant Iron or Nails

Wanted in exchange for 300 tons No. 1 Wrought Scrap Iron.

GILCHRIST & GRIFFITH, Mount Pleasant, Iowa.

Special Notices.

An Experienced Mechanical Engineer, familiar with estimating and designing Propeller and general Marine Machinery, Locomotive, Corporation Pumping Engines, &c., will shortly be disengaged. Would like a superintendency or charge of a drawing room. Address, for reference, **A. E. W., 114 Fulton Street, N. Y.**

MERCANTILE AGENCY.

For the sale of Hardware or any Mercantile Business. Stores of all kinds for sale and wanted. Parties desirous of going into business cannot do better than to address this agency. Also clerkships secured, best of reference required. Parties wishing clerks or assistants, stamp enclosed gives full particulars. Address, **JOHN J. HARRIS, Box 1633, Binghamton, N. Y.**

For Sale.

A new machine for making **BOILER RIVETS**, from one-half inch to one inch. Also new **BOLT HEADERS**, &c., for heading screw bolts from three-eighths to one inch. Duplicates of each in successful operation for ten years. Will exchange for bar iron or wrought scrap.

Address, **RIVETS, Office of The Iron Age, 10 Warren St., N. Y.**

TO INVENTORS.

Patents secured in the United States and Europe, on the lowest terms and very

PROMPTLY,

by **A. V. BRIESEN**, Solicitor of Patents and Attorney at Law in Patent Cases.

258 Broadway, N. Y., cor. Warren St.

SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools for making Angers and Bits, each running seventeen years; dated as follows: Dec. 19, 1855; January 31, 1856; and July 8, 1856. There is a special claim on each of the Dies. All persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings, DEER RIVER, Conn., Sept. 7, 1874.**

AGENTS WANTED.

SPECIAL INDUCEMENTS. We want a first-class agent in every country in the United States, and also in Europe, to sell the world-renowned **Wilson Sewing Machine**, and the **Wilson Manufacturing Machines**, to whom we are prepared to offer Extraordinary Inducements. For full particulars, apply or address **Wilson Sewing Machine Co., 327 & 329 Broadway, N. Y.** Special Inducements to Exporters.

An iron worker of large experience in this country and England, with the best testimonials as to character and capacity, wishes an engagement as manager or foreman of a mill or forge. Has had 30 years' experience in the manufacture of bars, hoops, plates, sheets, and puddle steel.

Address, **J. L., Office of The Iron Age, 10 Warren St., N. Y.**

An experienced buyer of Hardware, Tools, Machinery, &c., will arrange with responsible houses on commission. Purchases made at lowest market rates. Correspondence solicited.

Address, **J. W., Office of The Iron Age, 10 Warren St., N. Y.**

Charcoal Blast Furnaces.

Having during the past 10 years constructed and put in operation a number of the most successful Charcoal Blast Furnaces in the country, and having a competent corps of workmen constantly in my employ, I am enabled to offer advantages in constructing or remodeling upon the latest and most approved plans.

Examinations of Furnace Property made and reported upon when solicited. Correspondence promptly attended to.

J. M. WHITE, Engineer, 22 W. Alexander St., Rochester, N. Y.

THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.
Surplus - - \$1,800,000, Gold.

The New York Agency, No. 50 Wall Street, buys and sells Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.

J. G. HARPER, J. H. GOADBY, Agents.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 59 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

A PARTNER WANTED

by the 1st of January, 1875, in an established Hardware business, who can put in from \$30,000 to \$25,000, either cash, or stock suitable for jobbing trade.

For particulars, address, **B., Office of The Iron Age, 10 Warren St., N. Y.**

HARDWARE.

FOR SALE in the best business part of Jersey City, a first-class Tool and Hardware business. Established about 25 years, and doing a fair business.

Apply to **H. LUTGEN, 57 Montgomery St., Jersey City.**

EUGENE BISSELL, AUCTIONEER.

By BISSELL & CO., Successors to R. T. HAZELL & Co., Store No. 94 Rector Street.

Our REGULAR SALES OF HARDWARE, CUTLERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season. CASH ADVANCES made on CONSIGNMENTS without additional charge.

Wanted.

A situation as bookkeeper or cashier of an iron works, a hardware business, or in the coal trade, which the advertiser understands in all its branches. Highest references of character, capacity, &c.

Address, **H. D., Office of The Iron Age, 10 Warren St., N. Y.**

A Roller wants a situation as a steady and experienced workman on either guide, hoop or bar iron. Can turn rolls and take care of steam engines and machinery. For further particulars, address, **Boonton, N. J., Box 96.**

Special Notices.

THE Fletcherville Blast Furnace Co., Manufacture

CHARCOAL PIG IRON.

Exclusively from New Bed Pure Magnetic Ore, suitable for Bessemer, Malleable and Car Wheel purposes, or for foundry use where very soft and strong iron is required.

Analysis of Average New Bed Pure Ore.	Analysis of No. 1 Bessemer Pig.
Metallic iron..... 68.240	Undertermined matter and loss..... 134
Oxygen with iron..... 26.010	Silicon..... 1.019
Water..... .380	Carbon..... 3.821
Insoluble silicious matter..... 4.320	Phosphorus..... .048
Sulphur, practically none	Sulphur, practically none
Phosphorus..... .008	Calcium..... .140
Alumina..... .280	Metallic iron..... 94.838
Lime..... .140	
Undertermined matter and loss..... .592	100.000
100.000	

Witherben & Fletcher,

Port Henry, Essex Co., N. Y.
Furnace at FLETCHERVILLE, near Mineville, N. Y.

A. PURVES & SON,

Corner South & Penn Streets, Phila., Dealers in

Scrap Iron & Metals, Machinery, Tools, Shafting & Pulleys, Steam Engines, Pumps & Boilers, Copper, Brass, Tin, Rabbit Metals, Foundry Facings. Best Quality Ingot Brass. Cash paid for all kinds of Metals and Tools.

For Sale.

Great Auction Sale

Of Valuable Machinery and other property.

The undersigned Trustees will offer for sale at Public Auction in the city of Auburn, N. Y., all the interest in Letters Patents, Patterns, Tools, Machinery, Stock and Fixtures, including "Extras" for Repairs, belonging to the late **DODGE & STEVENSON MFG. CO.**

THIS LARGE PROPERTY consists in part of Shafting, Pulleys, Iron Planers, Lathes, Drills, Screw Cutters, Shears, Presses, Punches, Grinding and Polishing Machines, Boring and Slotting Machines, Circular and Jig Saws, Wood Planers, Shaping Machines and other machinery for wood working; Brass Furnace and fixtures; Patterns, Flasks, Tumbling Barrels and Tools and fixtures for Iron Furnace; Blacksmiths' Forges, Fans, Vises, and large quantities of Smith Tools; Lumber, Iron, Paints and other stock.

The same is on exhibition at the works of the late Company, and printed lists with description and terms of sale can be obtained at same place or by letter addressed to **G. J. LETCHWORTH**, for Trustees, Auburn, N. Y.

This sale will be of especial interest to Manufacturers of Reapers and Mowers, and other Agricultural implements, as well as to Machinists, and dealers in Second-Hand Machinery. Sale will commence on Monday, January 25, 1875, at 9 A. M., and continue till sold.

AUBURN, December 29, 1874.
G. J. LETCHWORTH, J. S. TOMPKINS, J. S. FOWLER, FRED. M. TERRILL, Trustees.

BUFFALO Union Stove Works For Sale.

CENTRALLY SITUATED.

Has always done a good business, which, with the addition of a few new goods, can be greatly enlarged. This is one of the best constructed foundries in the country. Will be sold with all its patterns and fixtures at a bargain, if sold soon. Apply to or call upon **A. REID, Atty for GEO. B. BULL & CO., Buffalo, N. Y.**

To Rent.

First and third floors—together or separate. Brick building 125x50, well lighted and the best business location in the city. Light power will be supplied if desired, or parties can furnish their own if preferred. Address, with particulars, **H. D. STANLEY, Secretary, Bridgeport, Conn.**

To Quit Business.

Will sell the best appointed Hardware Store Building in the State of Ohio, with or without stock. Doing a very large and satisfactory trade. No bonus for the trade. Parties purchasing will have a good and satisfactory business from the opening. Property rents at good prices.

For particulars inquire of **JOHN E. BYRNE, 99 Chambers St., N. Y.**

JAMES C. JACOBS, Wooster, Ohio.

DECATUR AGRICULTURAL WORKS

For Sale.

Five acres ground, commodious buildings, all necessary machinery. Capacity 200 hands, railroad facilities unsurpassed, abundant water, cheap fuel. Cost \$20,000. Will be sold at a great bargain if taken soon. Address, **L. BURROWS, Secretary, Decatur, Ills.**

For Sale,

Stock of Hardware, at Lyons, Iowa. New and desirable store, one of the best in the State, doing a good cash business. No better business stand can be found. Location established in 1865. Will be sold on reasonable terms. Reasons for selling, loss of health. Address, **J. B. DOLAN, Lyons, Iowa.**

THE McHaffie Direct Steel Castings Co.

STEEL CASTINGS, Solid and Homogeneous, guaranteed to stand a Tensile Strain of 25 tons per square inch. An invaluable substitute for expensive WROUGHT IRON FORGINGS or for Iron Castings, where great strength is required. Office, cor. Evelyn and Levan Sts., PHILADELPHIA.

Send for Circular and Price List.

For Sale, &c.

MACHINERY FOR SALE.

The following machinery, &c., being that recently owned by the

American Rolled Nut & Tube Co., at very low prices. Consisting of several sets of

ROLLS, HOUSINGS, BED PLATES, &c., for Rolling Nuts, including machines for finishing. 1 train of

8 in. Guide Rolls.

Large quantity of

Rolled Nuts for Bolts, from 1 1/4 to 2 in. diameter, reamed and burred ready for use. Lot of

STANDING PLATES.

These nuts have been extensively used, and are regarded as equal to any made, and will be sold much under the market value. Will also sell a

Fourth Interest in the Patent for making these Nuts.

It is confidently believed that nuts can be made on this plan cheaper and better than on any other yet adopted, and may be rolled of any length or size that may be required. All of the above machinery is nearly new and in complete order. For further information, apply in person or by mail to

N. C. NEWTON, Metropolitan Iron Works, Richmond, V.

English Cutlery Business

For Sale.

In consequence of the death of some partners, and desire of others to retire, an

English Hardware & Cutlery Business, conducted for many years with great and continuous success, and now in full operation, is

Offered for Disposal.

It has a moderate stock in New York, recently imported; a first-class connection all through the United States with the importers and large buyers, both by direct importation and from stock. The Manufacture in England will be continued as heretofore, and offers an arrangement for the supply of

Cutlery and Hardware at cost there, produced with a thorough knowledge, gained by long experience, of the requirements of the U. S. market.

Parties taking the business may avail themselves of the same experienced assistants who have been with the house for many years, and who have a full knowledge of the trade, customers, &c., so that the succession of the business may be secured with a prospect of the same results which have attended its previous history. For further particulars apply by letter, addressed **E. C. H., Office of The Iron Age, 10 Warren St., N. Y.**

HARDWARE STORE FOR SALE.

The subscriber offers for sale on low terms and reasonable time, the stock of Hardware lately owned by Kelley & Brown. Stock new and in good condition. The same room, in connection with which is a valuable good will, can be leased for the carrying on of the business. A good chance is here offered to any one desiring to go into the Hardware business. Call on, or address, **F. S. BALDWIN, Massillon, O.**

For Sale or Rent on Easy Terms

A four story brick factory 46x60 ft. with unfailing water power of about 25 horse-power, auxiliary steam engine of 20 horse-power. Adjoining are engine, barn and other outbuildings. Situated near depot of three railroads, and lines of boats to New York and Philadelphia. Every facility for manufacturing and getting goods to market at cheapest rates. Apply in person or by letter to either **JOSEPH W. ALSON, ROBERT N. JACKSON, CHARLES E. JACKSON, Executors, Middletown, Conn.**

WHITE & ERLING,

Manufacturers of

Pressed and Japanned

TIN WARE,

Milwaukee, - - Wis.

Solicit correspondence from parties having **Tinners' Specialties and Goods** in our line of manufacture to sell. A large acquaintance with the trade of the Northwest makes us desirable mediums for manufacturers and inventors for introducing and selling their goods in connection with our own.

FOR SALE.

An 8 1/2 inch mill train for making Merchant, Band and Hoop Iron. Will be sold cheap.

Apply to **W. W. JONES, Near the Lehigh Valley Railroad Depot, Allentown, Pa.**

For Sale or Lease,

The Union Chain Cable Works, 1845 Richmond St., Philadelphia, Pa. Lot 144 feet by 190; 19 acres; 35 horse-power engine; best tester in the country; dwelling house adjoining; finest works in America.

CALIN & GORDON, S. W. Cor. Queen & Swanson Sts., Philadelphia.

FOR SALE.

At Lowest Manufacturers' Rates,

GUNS & SHEET ZINC, Best German and Belgian Brands,

explain the chemical nature of the above elementary substances, and of their various compounds, paying particular attention to hydrogen gas, and after explaining the process of combustion, as exemplified in a burning candle, proceeded to consider combustion in the furnace in the following terms: We will suppose some time has elapsed since any fresh fuel has been thrown on the fire, and we find that the fuel on the bars presents to our view a glowing incandescent mass, with no appearance of smoke, and no flame, and we will suppose that the only access for the air necessary for supporting combustion is through the fire bars from the ash-pit, through the incandescent fuel, and finally away to the chimney, and I need scarcely say that the supposed case is one of very common occurrence. The moment the air comes in contact with the incandescent fuel, it is resolved into its constituent nitrogen and oxygen, the nitrogen passes on to the chimney with no further change than increase of volume from increase of temperature; the oxygen, however, is arrested, and each atom of carbon seizes two atoms of it, and one atom or equivalent of carbonic acid is formed.

If this carbonic acid got away to the chimney, nothing further could be desired, and complete combustion of the coke would be effected. But it is not destined to escape in this manner, for before the atom of carbonic acid has struggled through the mass of fuel, and got free from it, it has taken up another atom of carbon, and now, instead of being carbonic acid CO_2 , it has been converted into CO , or two equivalents of carbonic oxide, and it is this gas which escapes to the chimney. Experiment has proved that carbonic acid is not combustible, but that carbonic oxide is; and it stands to reason if anything of a combustible nature is escaping from the chimney, we cannot be having complete combustion in the furnace; but there are very few practical men who have any idea whatever as to the magnitude of the loss of heat when carbonic oxide is the result of combustion instead of carbonic acid, for we find, from calorimetric experiments, that in the former case we only get three-tenths of the evaporative power produced by the latter. Now, in order to burn this carbonic oxide, we must supply each atom of carbon in it with another atom of oxygen, while the carbon is at a sufficiently high temperature. If the combination is effected, then our carbonic oxide is reconverted into carbonic acid, and has given out during its recombination seven-tenths of heat which we noted were deficient in the formation of the oxide.

The next point considered was the gaseous portion of the coal, and it was pointed out how fuel might be lost, either by the gas escaping wholly, or by only being partially burned; the latter alternative causing the formation of smoke and soot. Mr. Carter showed how this latter alternative was generally attributable to the want of a proper supply of air admitted above the fire, or to the flame being brought into contact with the metal plates of the boiler, and, so cooled down below the temperature necessary for ignition of the gas, and mentioned the following instance.

Last winter I had a little stove in one of the rooms of my house; it is one of those commonly known as a Gill stove. The whole of the air supporting the fire had to pass from beneath through the bars, and consequently through incandescent fuel before reaching the flue. I was greatly disappointed with the performance of this little stove, as far as its heating power was concerned; eventually I took off the door and drilled a number of small holes in it, so as to admit jets of air above the fire. The fire inside has been as bright and lively again since this little surgical operation, and the quantity of soot collecting in the flue, which before proved a constant nuisance, is now almost reduced to nil. This is an instance of how simply a remedy may sometimes be applied.

After going through various calculations to show the quantities of air required above and below the fire for certain quantities of coal, and how smoke and soot were formed, Mr. Carter concluded in the following terms:

So long as popular errors prevail amongst that class of men who have the direct control of furnaces of all descriptions (I allude to the practical managers or foremen in manufacturing works), little will be done to prevent waste of fuel; and, as a rule, when you begin to speak to them about carbonic acid and carbonic oxide, they look at you with an incredulous smile. You at once lose taste with them, and fall from the high position of a practical man to the pitiable status of a mere theorist. But I maintain that this is not simply a matter of theory, but that the principles involved are of an eminently practical nature, and if applied in practice may be turned to good account. We must impress on the practical man that air is required in certain quantities and delivered in certain methods. We must combat the idea that gas is smoke, or that gas and smoke are synonymous terms. We must point out that volumes of black smoke do not constitute the only indication of waste of fuel, for, as I have shown, the waste may be enormous although there is no vestige of smoke to be seen. We must challenge the idea that a furnace can consume its own smoke, that is simply impossible; we can construct a furnace to prevent the formation of smoke, but let smoke once be formed, it cannot be consumed in the same furnace, its presence indicating that the furnace is wanting in those conditions essential for the completion of combustion.

Loss of Pressure in Steam Pipes.

It is well known that the initial pressure in a cylinder seldom equals the boiler pressure; certain exceptions to this rule exist, however, to which we shall refer presently. The loss of pressure is usually attributed to the frictional resistance of the steam pipe and condensation within the latter. There is reason to believe, however, that although such a deduction is

consistent with facts in many cases, it is by no means always so. It is, of course, quite possible to make a steam pipe so small, and to full of bends and sharp turns, that it will cause considerable resistance, and consequent loss of pressure; and it will be found, we venture to say, in all cases where a considerable loss of pressure does really take place, that the steam pipes are made too small and that the velocity of the steam is over 100 ft. per second. The temptation to make long steam pipes too small is very great, because the cost of a considerable length of steam piping is not a trifle. When the piping is large enough no loss of pressure worth mentioning will take place, even though the pipe be two or three hundred yards long, so far as frictional resistance can effect the question. There is only one other cause of loss of pressure, and this is condensation in the steam pipe, and this must of necessity be almost wholly inoperative to the assumed end. A little reflection will show that the length of steam piping suspended in air required to condense steam nearly as fast as a boiler can supply it, would be enormous. It is impossible, in short, for a steam pipe of any reasonable length to have much less pressure at one end than the other, provided the velocity does not exceed 100 ft. per second. We may regard the effect of condensation as being the same as though a second engine were put on. If as much steam was condensed as was used by the engine, then the consumption of steam at the further end of the pipe from the boiler would be practically doubled, and the required velocity would then be 200 ft. per second instead of 100 ft.; that is to say, if the pipe were properly proportioned to supply the engine only in the first instance, there would in the second be a small loss of pressure due to the increased velocity of the steam required to make up for condensation; but this would not be due directly to condensation, but to the fact that the steam pipe was too small for its work. The remedy is obvious. Let the steam pipe be protected and the loss of pressure will become little or nothing. One of the best means of protection is to lay the steam pipe under ground in large wooden troughs—waterproof, if the ground be damp—or the troughs to be filled with dry sawdust or fine dry sand. If this arrangement be inadmissible, then the pipes should be covered with felt, or some one or other of the various compositions for the purpose in the market. The loss by condensation may, in this way, be reduced to 1 or 2 per cent. of the whole quantity of steam used by the engine. A pipe 12 in. in circumference and 200 ft. long would have 300 square feet of surface, and the total quantity of steam which such a pipe would condense, if exposed unlagged to air at 60°, would not exceed about 72 lbs. per hour. But the sectional area of such a pipe inside would be about 9 in. A cubic foot of steam would occupy 192 in., or 16 ft. of its length, and at 100 ft. per second, the tube would pass 6.25 cubic ft. per second, or 23,500 cubic ft. per hour. The weight of this steam, taking it at 50 lbs. pressure above the atmosphere, would be 4017 lbs. Assuming that the engine used 60 lbs. per horse-power per hour, this would represent over 66 horse-power, and as the loss by condensation would not exceed 72 lbs. it will be seen that it is ridiculous to talk of condensation in the pipe as a cause of loss of pressure. In a word, it may be stated that loss of pressure in a long steam pipe can only take place as a result of the frictional resistance of that pipe to the fluid moving within it; that sharp bends materially increase the resistance; but that if the pipe is tolerably straight and sufficiently large, the frictional resistance will be almost inappreciable; in no case can condensation be a cause of loss of pressure unless the pipe is exposed uncovered to rain, or water in some other form, and that the loss of pressure will then be due, not to condensation, but to the fact that those portions of the pipe near the boiler will be too small to supply the extra demand for steam at the other end of the pipe, unless the steam flows at such a velocity that the frictional resistance of the pipe will operate prejudicially. It is not to be denied, however, that in many instances in practice there is a very serious loss of pressure between the engine and boiler in long pipes. In all such cases, however, the pipes are too small for their work, or they are improperly fitted. We can call to mind one which came under our own knowledge, where the difference in pressure between the boiler and the engine, with a 3 in. pipe about 12 ft. long, was as much as 12 lbs. The engine had only just been started; the stop valve was held to be guilty, and was changed for one larger. This did no good. Then new steam pipes were ordered, and when the old one was taken down, it was found that the whole cause of the mischief lay in the fact that the man who put the pipes up, in making a flange joint, used a ring wrapped with tow and red lead. The inner diameter of the ring, instead of being 3 in., was little more than 1 in. The joint was re-made as it should be, the pipes re-erected, and there was no more trouble. Nothing is more common at collieries and mines than the use of long steam pipes made of any kind of tubing at hand, and of varying diameter, but invariably too small. Then we hear of loss of pressure, and it is on no better basis than this, that the whole theory of pressure being lost, if a steam pipe is long, has been built up. In designing steam pipes, as well as any other appurtenance of a steam engine, nothing is more easy than to make a mistake.

length and size, and shaped and fitted by our own workmen. So of the boilers, machinery, and edge tools which are sent away in such large quantities. We have in our midst the rolling mills necessary for the performance of all this work, but their product is not wholly consumed here, the conscientiousness with which the iron is prepared and the superior quality of the material itself having brought to our manufacturers a large trade from other cities.

In this article it is our purpose to speak only of plate and boiler iron manufacture, to bring into more public notice an interest the extent and importance of which is not sufficiently known and appreciated. Until within a few months past there was but one rolling mill in this city for the manufacture of this class of iron, or rather two mills owned and operated by one firm—Seidel & Hastings. Recently the Christiana Iron Co. have erected a similar enterprise on the South side, but, although completed, it is yet without orders sufficient to justify its starting up, and it therefore remains idle. Seidel & Hastings, however, have only recently begun to feel the effects of the dull times, they having been able to secure orders sufficient to keep them busy up to October 1st. Since that time their trade has been quite dull. During October and November they ran, on an average, four days in the week, but during the present they have been making only three days. They run exclusively on orders, and when these are finished the works necessarily stop.

The mills of Messrs. Seidel & Hastings are known as the Wilmington Plate Iron Rolling Mills, and are located on Church street above Ninth. They make plate iron of all descriptions from $\frac{1}{8}$ to $1\frac{1}{2}$ inches in thickness for boilers, iron ships, iron bridges, oil and water tanks, and all the various purposes for which iron plates are used. The works were established in 1845, and consisted for many years of a portion of what is now known as the "old mill," having a capacity for making about 700 tons of plates of the smallest sizes, such as were in demand in those days. The present firm was organized in 1867, and the business gradually extended to more than four times what it originally was. The old mill was enlarged and improved, and in 1870 their large new mill, fronting on Church street, and about a half square distant from the old mill, was erected and put in operation. They have also erected a charcoal forge of five fires for the manufacture of blooms from which plates are made.

Perhaps we should explain that the blooms thus manufactured do not constitute the whole of the raw material consumed by this firm. They obtain the remainder direct from the furnaces in the Pennsylvania iron region and from Virginia, the weight of each being from 250 to 280 pounds. The capacity of the works at present operated is 3000 tons of plate iron and about 2000 tons of blooms annually, working in day time alone. The works are not run at night as many rolling mills are. Working day and night, the capacity would be nearly doubled. The mills employ from 100 to 110 men, and when in operation the whole force is engaged.

The machinery is of the most improved kind and ample for the easy and rapid facilitation of the work. There are two large engines for driving the roll trains, and three smaller ones for driving the shears, of which there are 9 pairs capable of shearing plates from $\frac{1}{8}$ to $1\frac{1}{2}$ inches cold. Another engine drives the forge. The steam which moves the engines is generated in four large boilers. There are also two steam hammers for making fire box iron, and one trip-hammer for hammering blooms. The rolls (between which the blooms after being heated in the furnaces are pressed out to the required thickness) in the old mill are 66 inches long by 19 inches in diameter, and in the new mill 77 by 23 inches. Steam lifters are provided for lifting the iron over the rolls, one in each mill, and there are also five cranes for lifting heavy piles and plates of iron, and a patent labor-saving machine which will lift from 1600 to 1800 pounds of iron from the scales and place it upon the wagons.

Such is the character and such are the appliances of one of the weighty industries of Wilmington. It has gradually grown with the city, receiving a large trade and conducting a very profitable business. The product of the mills is largely consumed at home, the iron ship-builders of this city using, to a great extent, their plates in the construction of iron ships. The Harlan & Hollingsworth Co. have used their boiler iron exclusively for the past ten years. In good times they have a large trade in the Eastern States, two large locomotive builders there also using their iron for locomotive boilers exclusively. At present the business is extremely dull and the outlook not encouraging.

Deep Mining.

Many of the leading mining companies on the Comstock lode are now down to the depth of 3000 feet, and a few still deeper. When mining first began on the great lode, such a depth was not thought of, or, if thought of, no one expected to see mining operations carried to such a depth as 2000 feet in less than fifty years. Now we not only do not feel startled at hearing the great depth of 4000 feet spoken of, but when we see preparation in actual progress, for sinking that far, we think but little of it. The Savage Company, whose works we recently visited, have broken ground for the foundations of new machinery, which is to be sufficiently powerful to sink their main incline to a depth of 4000 feet. This incline is already some distance below the 200 foot level, and is still being vigorously pushed downward. The new hoisting machine will be supplied with two 24 inch horizontal cylinders, of 4 feet stroke, and will be of over 60 horse power. The foundations of this engine are being laid about 80 feet to the westward of the present hoisting works. A building, 50x60 feet in size, will be erected over the new hoisting engine and the machinery connected therewith. The carpenters are already at work framing the timbers for this building. The steel wire rope to be used is to

be 4000 feet in length, and will weigh about 24,000 pounds. It is now being manufactured by John A. Roebling's Sons, Trenton, N. J. It will be a round rope, and the upper end will be 2½ inches in diameter, but 2500 feet of its length will be tapered, and the lower end will be 1½ inches in diameter. The reel on which this cable will wind and unwind will be conical, and the cable will wind about it spirally. The Ophir Company contemplate the erection of similar machinery, and propose pushing their works to a like depth. The Crown Point Company already have in operation machinery of much the same character as that being erected by the Savage folks, and having a cable of sufficient length to sink to the depth of 3500 feet. The Hale & Norcross Company, Consolidated Virginia Company, and other leading companies at this end of the lode, will erect similar powerful works, and will at once plunge down into the great unknown "depths profound," in which lie hidden the silver roots of the Comstock.—*Virginia Enterprise.*

We remark that Messrs. John A. Roebling's Sons, of Trenton, N. J., manufacturers of the tapering wire ropes, above mentioned, have secured a patent on the same, the wires of their patent rope being continuous and tapering from one end of the rope to the other. The advantage in using these ropes for avoiding the dead load on the hoisting machinery for deep mining, is very great. At a depth of 2000 feet it is double that of the ordinary wire rope heretofore generally used; at 3600 feet the advantage is three-fold. Practical economy will result from their use when a depth of 1400 feet has been reached. The superior character of the tapering ropes made by the Messrs. Roebling with continuous wires from end to end, will be apparent to the mine operator and engineer when we state that the old method of making tapering ropes, and still in use in Europe, was and is by leaving out wires at intervals, so that a rope with 19 wires to the strand at the larger end would have only seven wires to the strand at the smaller end; and, aside from this defect, would have a multitude of ends of wires along its entire length constantly liable to work out and render the rope ragged, while, at the same time, they would subject it to an unnaturally rapid wear and tear, especially the latter. The Roebling system secures a rope having an equal number of wires throughout each strand, and a perfectly even surface that insures the largest possible wear.

The Scripture of Science.

The Cincinnati Commercial publishes the following very clever satire on the teachings of modern scientists, which is presented in the shape of a chapter of scripture according to Tyndall, Huxley, Spencer and Darwin:

GENESIS, CHAPTER I.

1. Primarily the Unknowable moved upon cosmos and evolved protoplasm.
2. And protoplasm was inorganic and undifferentiated, containing all things in potential energy; and a spirit of evolution moved upon the fluid mass.
3. And the Unknowable said, Let atoms attract; and their contact begat light, heat and electricity.
4. And the Unconditioned differentiated the atoms, each after its kind; and their combination begat rock, air and water.
5. And there went out a spirit of evolution from the Unconditioned, and working in protoplasm, by accretion and absorption produced the organic cell.
6. And cell by nutrition evolved primordial germ, and germ developed protogene, and protogene begat eozone, and eozone begat monad, and monad begat animalcule.
7. And animalcule begat ephemeris; then began creeping things to multiply on the face of the earth.
8. And earthy atom in vegetable protoplasm begat the molecule, and thence came all grass and every herb in the earth.
9. And animalcule in the water evolved fins, tails, claws and scales; and in the air wings and beaks; and on the land they sprouted such organs as were necessary as played upon by the environment.
10. And by accretion and absorption came the radiata and mollusca, and mollusca begat articulata, and articulata begat vertebrata.
11. Now these are the generation of the higher vertebrata, in the cosmic period that the Unknowable evolved the bipedal mammalia.
12. And every man of the earth, while he was yet a monkey, and the horse while he was a hipparion, and the hipparion before he was an oreodon.
13. Out of the ascidian came the amphibian and begat the pentadactyle, and the pentadactyle by inheritance and selection produced the hylobate, from which are the simiade in their tribes.
14. And out of the simiade the lemur prevailed above his fellows and produced the platyrhine monkey.
15. And the platyrhine begat the catarrhine, and the catarrhine monkey begat the anthropoid ape, and the ape begat the longimanous orang, and the orang begat the chimpanzee, and the chimpanzee evolved the what-is-it.
16. And the what-is-it went into the land of Nod and took him a wife of the longimanous gibbons.
17. And in process of the cosmic period were born unto them and their children the anthropomorphic primordial types.
18. The homunculus, the prognathus, the troglodyte, the antochton, the terragen—these are the generations of primeval man.
19. And the primeval man was naked and not ashamed, but lived in quadrumanous innocence, and struggled mightily to harmonize with the environments.
20. And by inheritance and natural selection did he progress from the stable and homogenous to the complex and heterogeneous—for the weakest died and the strongest grew and multiplied.
21. And man grew a thumb for that he that need of it, and developed capacities for prey.
22. For, behold, the swiftest men caught the

most animals, and the swiftest animals got away from the most men; wherefore the slow animals were eaten and the slow men starved to death.

23. And as types were differentiated the weaker types continually disappeared.

24. And the earth was filled with violence; for man strove with man, and tribe with tribe, whereby they killed off the weak and foolish and secured the survival of the fittest.

Testing an Iron Beam.

The following appears in the Albany Weekly Press, over the signature of Mr. T. J. Sullivan:

During the past few days we have witnessed at the machine shops of Messrs. Townsend & Jackson, the testing of a beam of rolled iron, manufactured at the Passaic Rolling Mills, New Jersey, with the results herein given. If all of the materials of the new capital are as well fitted to bear excessive strain as this has been proved capable of—and we are no reason for doubt on the subject, as far as the iron work is concerned—the durability of that immense structure will prove to be far in excess of the requirements it is ever likely to be called on to withstand. It is especially gratifying to Mr. Sullivan to find by the practical test made, that the quality of the material supplied by him is so very far superior to the limit of strength stipulated for in his contract with the Commissioners.

TEST OF 12½ INCH BEAM, MADE BY T. J. SULLIVAN, AT THE WORKS OF MESSRS. TOWNSEND & JACKSON.

The beam was 18 feet 6 inches long, 12½ inches high, 5½ inches wide, on top and bottom, flanges web ½ inch thick, resting one foot on wall on both ends, leaving the space between supports 16 feet 6 inches, and placed two feet from the ground. The beam was then loaded with pig iron (direct in the center) 15 feet in height, making total load of 80,330 lbs., and deflected under the different weights as shown in the following table:

Weight, lbs.	Deflection, inches.	Weight, lbs.	Deflection, inches.
19,327-285	¼ inch.	46,510-695	9-16 inch.
32,244-500	½ inch.	53,707-500	¾ inch.

This load was left on 13½ hours, in which time the beam deflected 1½ inches from constant pressure. The load was then increased to 40 tons with the following result:

Weight, lbs.	Deflection, inches.
59,078-250	2¼ inches.
64,419	2½ "
66,167-640	3¼ "
69,604-590	4 "
70,493-500	4¼ "
72,182-890	5 "
74,223-765	5-16 "
75,190-500	6 "
76,801-722	6¼ "
77,123-970	7¼ "
77,875-875	7½ "
79,701-930	8 "
80,330	8½ "

Total weight of beam, 1058½ lbs., which is equal to 80 tons, equally distributed over beam. Weights taken by Messrs. Townsend & Jackson.

The load being discontinued and removed from the girder, it came back to 7¼ inches curve, which showed that the beam was competent of bearing considerable more weight before showing signs of breaking. This beam was guaranteed to carry 15 tons, distributed load in tons 3000 pounds each, under deflection of 0-30-100 inches. The flange of the above beam was torn away about 12 inches on one side, done by the falling of a beam of the same size, which struck on end, which can be seen by inspection of the beam, as there are indentations from 3-16 to ¼ inch in depth caused by the force of the blow. And it being said that the beam was made of pot-metal, was very inferior in strength, Mr. Eaton, superintendent of the capital, naturally had doubts of its strength. For that reason I removed the beam and put it to actual test.

Although the beam was defective and the load placed direct in the center (which was the severest test that could be given), it has shown conclusively great strength. It will be seen by examination of the iron that it is of a first quality, being a very strong, fibrous iron. This beam will be placed at the new capital for inspection.

T. J. SULLIVAN.

Henry Conklin, of the late firm of Conklin & Huerstel, iron merchants, has established himself at 104 John street, where he is engaged in the sale of horse shoe, as well as other brands of iron and steel, on commission. He is also agent for the Powerville Rolling Mill, located at Powerville, N. J. His card can be found on the 20th page.

The iron works in Northern Ohio appear to be picking up. A new rolling mill has been opened at Ashtabula, employing about 60 hands. A manufactory of plows and steam machinery has also commenced operations there. Two new blast furnaces have just been completed at Wellstown. At Warren the works are all busy. The Grafton Iron Company is running full force. The Etna Furnace at Ironton has just started again. At Cherry Valley the Iron Company are running their furnaces full blast, and have decided to start the rolling mills and remaining furnace, giving employment to 200 hands. The Girard Works are running full time and will continue to do so. On the other hand, the Ironton Mill has closed. The Hubbard Rolling Mills, at Youngstown, have closed. Manufacturers in Belmont county propose a reduction of wages. The Niles Spike Mill has stopped, the men refusing to accept a reduction of wages. The rolling mill at the same place is running full time and employing 175 hands, at an average month's pay of \$45 per capita. About 800 men are employed at Lagonda in machine and chain shops there. They are working to their full capacity. The sewer pipe shops at Akron and neighborhood are running on one-third time, about 150 men being out of employment in consequence.

Wages are being reduced at most of the manufacturing establishments in Western Massachusetts from 10 to 25 per cent. The combination of cotton manufacturers for a reduction of time and production has nearly broken up, the Spragues and the larger corporations of Manchester, Lowell, Lawrence and Fall River having refused to enter into it, and thereby compelled the other mills to go to work again.

The Lehigh Chain Works, at South Bethlehem, Pa., are to be removed to Boston, shortly. They have been idle for some time.

Mr. Bessemer's Channel Steamer.

At last the "Bessemer" is practically completed, and is ready to receive her internal fittings and decorations, so that we may shortly expect to learn by actual trial the value of Mr. Bessemer's suspended saloon, which forms the great feature of the new Channel steamship, and in the execution of which no labor or expense has been spared. The "Bessemer," indeed, promises to be in active service before her ill-fated rival, the "Castalia," has been doctored sufficiently to enable her to go to sea.

The "Bessemer" was constructed for the Bessemer Saloon Ship Company, by Earle's Shipbuilding Company at Hull, from the designs of Mr. E. J. Reed, C. B., and the saloon with all its various fittings, mechanical appliances, etc., was entirely designed by Mr. Bessemer, who has also superintended the whole of the lavish internal decorations.

The "Bessemer" is 350 ft. long, and 40 ft. beam, and her draught such that she can at all states of the tide enter or quit the harbors at Dover and Calais. She is furnished with two independent engines indicating 4000 horse-power collectively, and two sets of boilers, and is propelled by two pairs of paddle wheels 36 ft. diameter, and placed 100 ft. apart. On the upper deck there is a row of state rooms extending the whole distance between the paddle boxes, and projecting 7 ft. beyond the deck on each side, so as virtually to increase the width of the central part of the ship to 54 ft. There are altogether 22 of these private deck cabins, beside a large smoking saloon. The deck itself is 270 ft. long, beside two lower parts at each end 40 ft. in length, and on these the capstans, etc., are fitted. The vessel is provided with a rudder at each end, driven by Brown's hydraulic steering gear, and it can, of course, enter or leave port without turning. Ordinary steering gear is also added. On the deck are placed some hydraulic cranes for transferring luggage, etc., with the utmost dispatch; the baggage will be, at the commencement of the journey, placed in special crates, which are transferred bodily by the cranes into the luggage room in the hold of the ship. Strong rooms for mails, specie, or treasure are also provided here below.

There is on deck a large second class saloon, and a fine promenade is to be found on top of the rows of state rooms already described. The chief point of interest in the ship, however, is, of course, the suspended cabin. In designing such a cabin, it was at once evident that the idea of gaining steadiness by suspension on runions like a ship's lamp or compass would prove quite insufficient for the purpose, because, although the compass card is, by means of its suspension on a double axis, maintained in a horizontal plane, it nevertheless rises and falls with the pitching of the vessel; hence, in adapting the principle of suspension to a saloon, it was necessary to place it in the center of the ship's length where the pitching is at a minimum, and in the center of her breadth; further, it was necessary to descend so far down into her hold as to reach a point or center about which the vessel pitches and rolls, and there to establish the points of suspension. But it was equally necessary to check and control the motion which the saloon would acquire if freely suspended.

The plan of placing the saloon in the center of a very long ship rendered it unnecessary to provide against the pitching motion, since the movement of the extreme ends of the saloon can never exceed one-seventh of the pitch felt at the ends of the vessel, because the length of the saloon is only one-seventh that of the ship.

Passengers booked for the saloon enter from the deck a long, covered and well lighted vestibule. Here there is an office, or receiving room, for small parcels carried by passengers; there are, also, on one side of the vestibule, suitable compartments for stowing wet great-coats, umbrellas, &c. The passenger, divested of these impediments, then descends by an easy staircase to a space below deck, and after passing the refreshment counter, enters the saloon at the central part of one of its ends. It should be mentioned that when the passenger first descends from the deck he is still in that part of the structure in which the usual motion of the vessel is felt; but as he advances along the passage before named, the floor on which he walks gradually has less and less of the ship's motion imparted to it, so that by the time he reaches the entrance to the saloon it is intended that all motion of the floor shall have ceased.

Arrived in the saloon, he may either ascend the principal stair leading to the promenade deck, or descend by the curved stairs into the saloon, on entering which he will find himself in a spacious apartment 20 ft. in height and 30 ft. wide by 50 ft. long. The saloon is of some what peculiar form, rendered necessary by the motions of the ship which surround it; but notwithstanding its unusual form, Mr. Bessemer has so arranged the structural parts that while great strength and rigidity are obtained, a pleasing architectural effect is given to the whole, which is not a little heightened by the judicious way in which the internal fittings and decorations are arranged. Extending along each side and both ends of this spacious apartment is a dais, along the back part of which a continuous sofa extends. Persons sitting here will be separated

from those who are promenading on the general floor, while the division of the long sides of the saloon into large bays by partial bulkheads forms a number of comfortable seats partially separated from each other. The overhanging cornice, which is very richly gilt, is supported on fine twisted columns in pale carved oak with a gold spiral bead; the capitals and bases are carved in varied foliage. In the lower part of these divisions are large panels exquisitely carved in oak by Rogers, each having a central shield bearing the monogram of the company; the foliage of the panels consist of acorns and oak leaves, the laurel, myrtle, lolly, tea and coffee plants, the tobacco plant, ivy, hops, etc. The back portion of the partial bulkhead, which is richly paneled in pale polished oak with gold moldings, conceals the large circular iron girders springing from the floor on either side and extending to the ceiling of the saloon. In this upper part they are again concealed by a delicate perforated tracery, while the spandrels are filled in with arabesques and figures painted in gray tints on a dead gold ground. All the spaces between, as well as the girders, are covered with polished oak panels, with rich moldings relieved by gilding. The ceiling is divided by deep soffits into six large compartments, and is covered with artists' canvases richly ornamented with delicate arabesques and central panels. Extending entirely along the sides of the upper part of the room is a row of circular-headed windows in ground plate glass, which allow a large volume of air to pass continually outward. The spaces below the windows are paneled, the end panels of each set being decorated with arabesques, while each round center panel has a female head after the antique. By the side of each window are long, narrow upright panels ornamented with Cupids and arabesques in a dead gold ground. All the spaces between these decorations are tinted in an agreeable color so as to harmonize in tone with the other parts. At each end of the saloon, and immediately below the girders, is a painting in oil, occupying the large molded oak panel, which is 17 ft. in length.

The whole of the walls of the lower part of saloon, as far as the top of the spiral columns, is paneled in pale oak, the large central spaces are decorated with gold and color enrichments on artists' canvases, forming a frame in which are painted, by Mr. A. S. Coke, figure subjects of life size, the series recording the various critical points in the story of Cupid and Psyche. Each large central panel is flanked by two narrow ones in arabesques executed in quiet gray tints on a dead gold ground. A similar treatment extends along both ends of the saloon, which is also arched over to correspond with the sides, and thus breaks what would otherwise have been a very awkward flat end to the saloon. There is also a raised dais in the center, on which half a dozen luxurious sofas are placed.

The dais which, as before mentioned, extends entirely around the saloon, serves to convey a large body of fresh air for ventilation, taken from a point beyond the paddle boxes, where it is wholly uncontaminated by the engine-room, bilge water, etc.; and it is conveyed under pressure, so that an easily regulated quantity is admitted to the saloon every minute. The air escaping under the small pressure necessary for its transmission expands into spaces formed beneath the dais for that purpose, and then flows through the long line of perforated panels which form the front of the platform on which the passengers are seated. In this way 3000 cubic feet of air per passenger can be forced in every hour; all the air so introduced must as quickly find its way through the window openings near the ceiling, carrying with it all the products of respiration and keeping the air of the saloon as fresh as that on deck. Proper arrangements for warming the air in winter are provided so as to render the atmosphere fresh and agreeable but not too cold. In addition to this spacious saloon there are included in the suspended structure (and, therefore, equally quiet) four well ventilated private ladies' cabins, each 10 ft. in height, 13 ft. wide by 16 ft. long. There are also at the opposite end of the saloon other rooms for smoking and refreshment.

Means are provided for instantaneously locking the saloon to the vessel, this arrangement being made also automatic, so that in case of a sudden breakdown of the controlling gear, the saloon may be securely fastened.

The Puddlers' Strike in Western Pennsylvania.—The Pittsburgh Commercial of Friday says: The fact that Messrs Lloyd & Black yesterday put their boilers at work at the old rate of wages, \$6 per ton, has led to reports that it is permanent, and that all the mills are soon to resume operations. Upon inquiry we learn that these reports are untrue. Messrs. Lloyd & Black supply articles, specially their own manufacture, and, owing to orders on hand, they were compelled to start their works again, but it will be but for a short time. As to the mill owners generally, we may state that they are more resolute than ever in their determination, from necessity, to hold out for a reduction. As confirming this necessity, we note the fact, by no means encouraging to Pittsburgh, that certain Harrisburg firms are

offering and selling merchantable iron here at prices with which our manufacturers are unable to compete. They are enabled to do this because they are paying only \$4.50 per ton for boiling.

A Giant Telescope.—A telescope of immense proportions has, Galignani says, been for some time past in course of manufacture at the Paris observatory, but is still far from its termination. It was commenced in 1865 by Mr. Leon Foucault, but the death of that savant and the events of 1870 and 1871 interrupted this work, which were subsequently resumed under the direction of M. Wolf. The power of the new instrument will exceed those of the Cambridge and Herschell telescopes, hitherto the largest known; its length will be 49 feet, and its diameter 6 feet 6 inches, while the dimensions of Herschell's were only 40 feet by 5 feet. The mirror will be of glass, but the surface will be faced with gold or silver. The telescope will be provided with a movable staircase.

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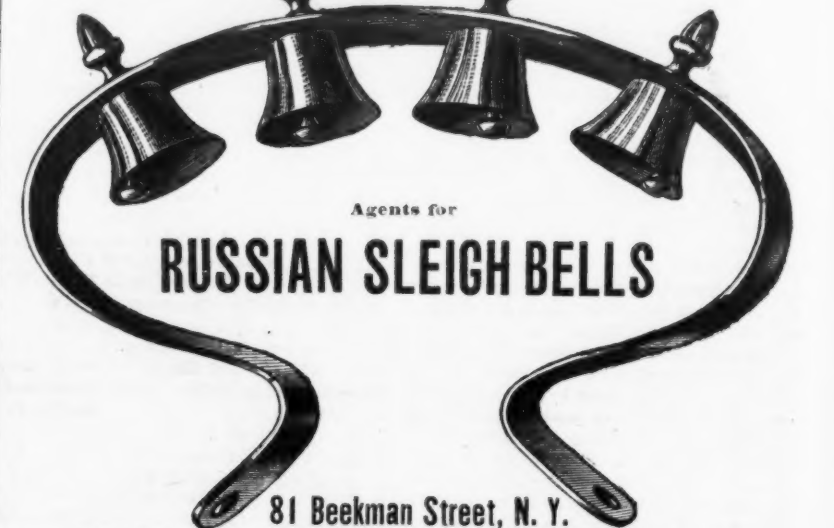
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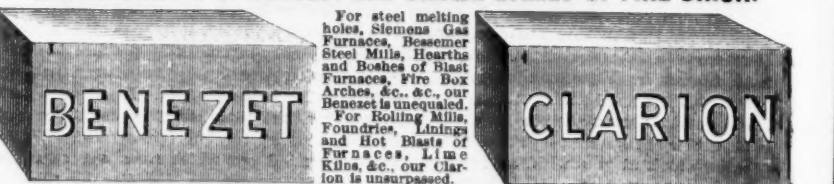
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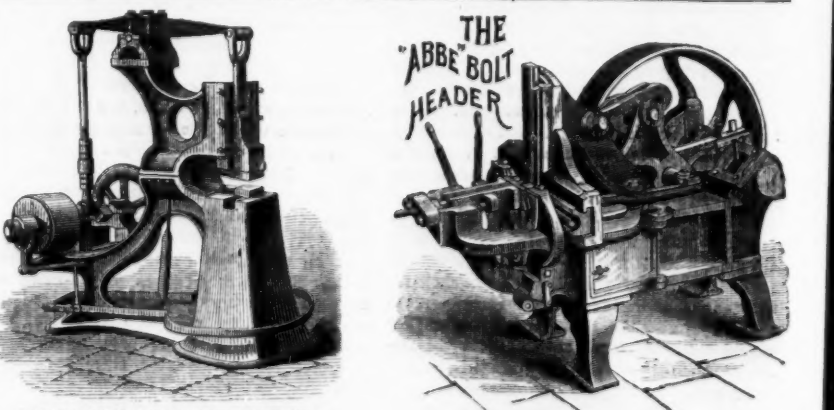
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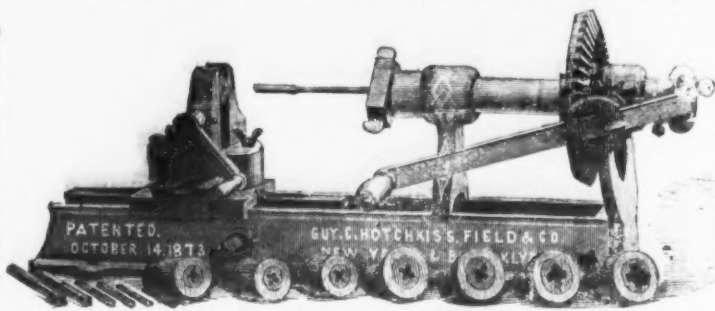
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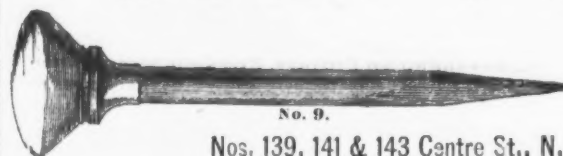


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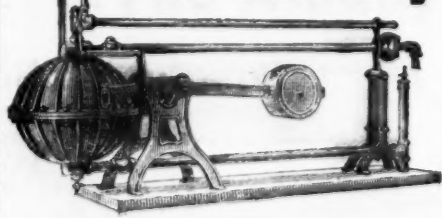
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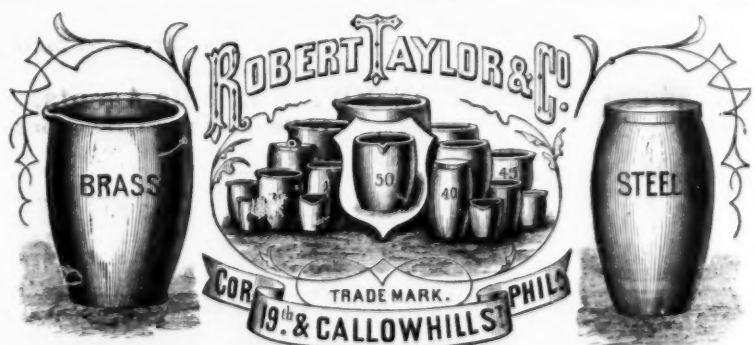
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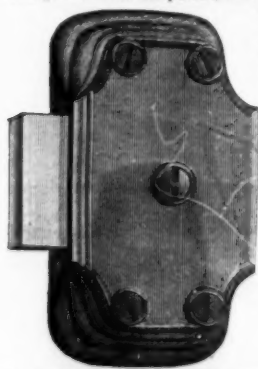
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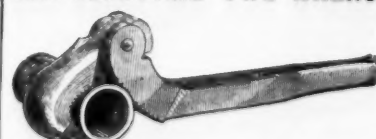
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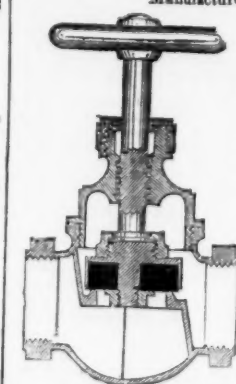
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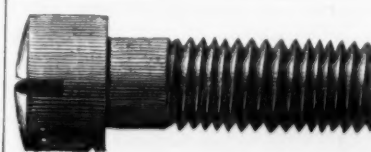
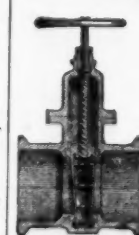
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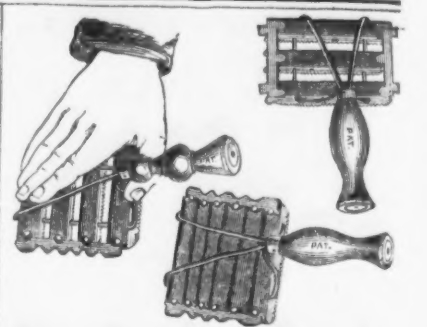
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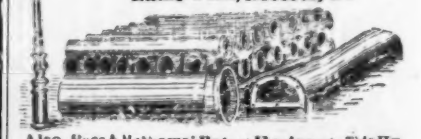
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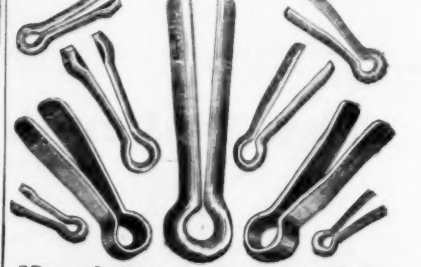
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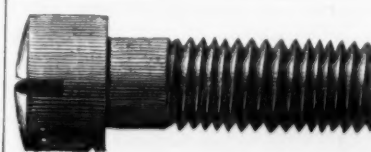
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Manufacturers of all shapes and sizes of FIRE BRICK for Foundries, Rolling Mills, Blast Furnaces, Gas Works, Lime Kilns, &c. A full stock of McKenzie and other Cupola. Also Fire Clays and Sand constantly on hand. Shipments made at the shortest notice. Send for Circular.

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NEWTON & COMPANY,

(Successors to Palmer, Newton & Co.) Manufacturers and Wholesale Dealers in FIRE BRICK of every variety and shape. Also, Ranges, Limes, Portland Cement, Fire Clay, Fire Sand, and all other materials for the iron and steel trade.

HORACE B. NEWTON, JOHN M. NEWTON

BLACK LEAD

CRUCIBLES.

Manufactured by

ADAM NEWKUMET,

1337 & 1339 N. Front St., Phila., Pa.

For Steel, Brass, Nickel, Copper, Bronze, &c. Equal to any in the market, and all guaranteed. We keep a full stock of all sizes on hand, and are confident of giving entire satisfaction to our customers.

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ESTABLISHED 1846.

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ESTABLISHED 1866.

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of reliable quality for all purposes, manufactured of the best New Jersey Fire Clay. Also, ROCKINGHAM WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin Ground Fire Brick, and Diminutive Building Brick.

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STOVE AND RANGE LININGS

of every description. Linings for Cupola or making the Hot Bed, &c. Also, ROCKINGHAM WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin Cupola Brick &c.

FIRE CLAYS, FIRE SAND & FIRE CEMENT.

Philadelphia Fire Brick

AND KENSINGTON FIRE BRICK WORKS

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Successors to JOHN NEWKUMET, Proprietors manufactures 9-inch Fire Bricks, Tiles, and Blocks for Rolling Mills, Blast Furnaces, Foundries, Gas Works, Lime Kilns, Glass Houses, &c. &c. Articles of every description made to order at short notice, and in a very superior manner.

"CLAY RETORTS FOR SUGAR HOUSES."

Brooklyn Clay Retort and Fire Brick Works,

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Manufacturers of

Clay Retorts, Fire Brick, Tile,

THE SPRAGUE CAN OPENER

MANUFACTURED BY THE
Sprague Can Opener Co.,
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Depot for New York City Delivery, with UNION HARDWARE CO., 120 Chambers, and 50 Warren Street.

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FOR OPENING
TIN PACKAGES OF
FISH, OYSTERS,
FRUIT,
& VEGETABLES.

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IT SHEARS CLEAN,
LEAVING NO RAGGED EDGES.
EASILY OPERATED.
ALWAYS IN ORDER.

Messrs. Riley and Henley's Puddling Furnace.

Messrs Riley and Henley, English iron masters, have devised a new form of furnace, made in the shape of a circular pan with slanting sides. The pan is made to revolve by any suitable means; the most preferable method being to mount the revolving pan on a vertical shaft, which is set revolving by bevel gear; the shaft is supported by a footstep and a collar or neck bearing, arranged in a cross-shaped bracket, which also at its four legs or arms stays the bottom of the two opposite outer furnace plates, back and front, together.

The driving gear for this revolving pan has two or more motions worked by frictional clutches, and may also, if desired, be worked by a separate engine, the speed of which is under the direct control of the puddler. The top of the pan is formed with a flange all round, either cast on, or made separately of cast or wrought iron and fastened on. This flange or hanging lip dips into a circular trough kept constantly supplied with water, thus forming a water lute, and keeping the air from entering into the pan at any part of the circumference, the outside of the pan at the same time being exposed to a full current of air, especially when the pan is revolving.

To prevent the rushing in of air into the pan from between the trough and the surrounding brickwork, a flange with a hanging lip is fastened to the brickwork all round the trough, the hanging lip also dipping into this trough and forming a lute joint there. To bring about a better diffusion of heat the trough may be made to revolve.

The upper edge of the pan may be cast hollow to form a water compartment all round, and this compartment is connected to a central tube with swivel tube joints at the bottom of vertical shaft, and so arranged as to cause a continual circulation of water.

The other portions of this new puddling furnace are built up and stayed by bolts and plates like the ordinary puddling furnaces, only that the plates at the back and front of the revolving bottom are cut short below, so as to admit the air freely there. An ordinary puddling furnace can thus be easily converted according to this invention.

The tools used in connection with this furnace are somewhat different from the ordinary appliances. During the first stage of the process a tool is employed which resembles the customary rabble, but having a hook which is caused to rest against the inside of the rabble hole in order to obtain a hold against the revolving mass of iron in the pan; the iron is thus agitated rapidly while on the boil. During the "boiling" of iron a blast may be used, consisting of a thin, broad, flat current of air, diffused across the surface of the iron in a slanting direction toward the neck of the furnace, and from the side opposite to the rabble hole. When the iron begins to form the speed is reduced as required, and the puddler then makes use of another tool which the inventors call the plow, because it approaches in its shape the form of a plowshare, and causes a complete turning over, breaking up, and clearing of the iron. When thus sufficiently worked, the iron is balled in the usual manner, and that either from one or both sides and in balls of any required size.

**Faugh's Patent
ROUND BRAIDED
Belting.**

THE BEST THING OUT.

Manufactured only by
C. W. ARMY,
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Send for Circular.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

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The following superior and well-known Lehigh Coals are mined by ourselves, and firms connected with us, viz.

A. Pardee & Co. HAZLETON, CRANBERRY, SUGAR LOAF

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LONDON MFG. CO.
Copal Varnishes
AND JAPANS.**

To Coach Makers, Hardware Manufacturers, Car Builders,
And the Trade generally using

Varnishes & Japans.

Aware of the impracticability of importing these articles at a price sufficiently cheap for use here, we take pleasure in stating that, aided by an extensive experience in England, Canada and the United States, we are enabled to supply an article which, upon trial, will demonstrate its being **EQUAL TO ANY** English made, and unexcelled by any made in America, for its quick drying quality, as well as for its being durable and brilliant in color.

BRUNSWICK BLACK,

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No. 1, \$1.25 per gal. No. 2, \$1.00 per gal.

The London Mfg. Co.,

In submitting the

DAZZLE BLACK BAKING JAPAN

(And their Japans generally)

would call the attention of Sewing Machine Companies, Lock Manufacturers, Japaners and other manufacturers using or handling Japans, to its peculiar qualities both as a preparing and finishing Japan. For the fine work of Sewing Machine Companies, safe makers, and ornamental work of all description the Dazzle Black Baking Japans are highly desirable, both as an Iron and Wood Japan.

These Baking and Self Drying Japans contain no coal tar, coal gas nor deleterious substance, but are made from pure and unadulterated gums.

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Factory, Newark, N. J. 113 Chestnut St.

**ERIE
Lawn Mower**

For 1875.

PERFECTED WITH

ADJUSTABLE CUT.

Manufactured by

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SOLID BOX VISES,

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Warehouse, 101 & 103 Duane St., N. Y.

HERMANN BOKER & CO.,

Our Vises are Warranted to do more work than any other make. No broken boxes or screws.

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Sole Manufacturers of the celebrated

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For the rapid and perfect grinding of Planer, Paper Cutting,

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These goods are unsurpassed for elegance of design, workmanship, capacity and durability. First premium awarded by American Institute, N. Y., 1870 and '73; Medal and Diploma by M. C. M. A., Boston, 1874.

Fast Cutting—Free from Glazing—It is the best Solid Emery Wheel.

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M. H. JONES & CO.,

COHOES, Albany Co., N. Y.

Manufacturers of **AXES** and **EDGE TOOLS.**

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TEMPERING SHOP

Sole Manufacturers of the late TEN EYCK AXE MFG. CO.'S GOODS.

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Keystone Saw, Tool, Steel and File Works,

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MANUFACTURERS OF

Barker's Patent Double Reversible Joint Butt Hinges and Concealed Door Springs.

THE BEST IN THE UNIVERSE, ALWAYS RELIABLE.

They never get out of order, and give unbounded satisfaction wherever they are used.

HENRY DISSTON & SONS desire to call the attention of the Hardware Trade; also Architects, Builders, Carpenters, and all parties interested, to the

PATENT REVERSIBLE BUTTS

represented in the annexed engravings.

For the doors of Churches, Schools, Theatres, Banks, Factories, Public Buildings, Hotels, and all places where it is necessary or desirable to swing a door both ways, these Hinges are vastly superior to all others. The neatness of the Butt and the simplicity of its construction make it far more desirable than most of the uncouth and unwieldy hinges now in common use. The concealed spring is the strongest, most durable, and the simplest, consequently the least liable to get out of order.

It is the *neatest*, and being concealed, does not present that unsightly appearance which usually so disfigures doors that have Springs.

It relieves the Butts of the weight of the door, and consequently adds to the strength.

It prevents the door from sagging.

It is more readily applied and easily disengaged, and is altogether the most effective, convenient and elegant Spring that has ever been offered to the public.

Every Spring has been thoroughly tested, is warranted, and will bear twice the strain that is ever applied to a door.

It is by far the cheapest.

Cross-Cut Saws.

We desire to call special attention to our various styles of Cross-Cut Saws represented in this week's issue.

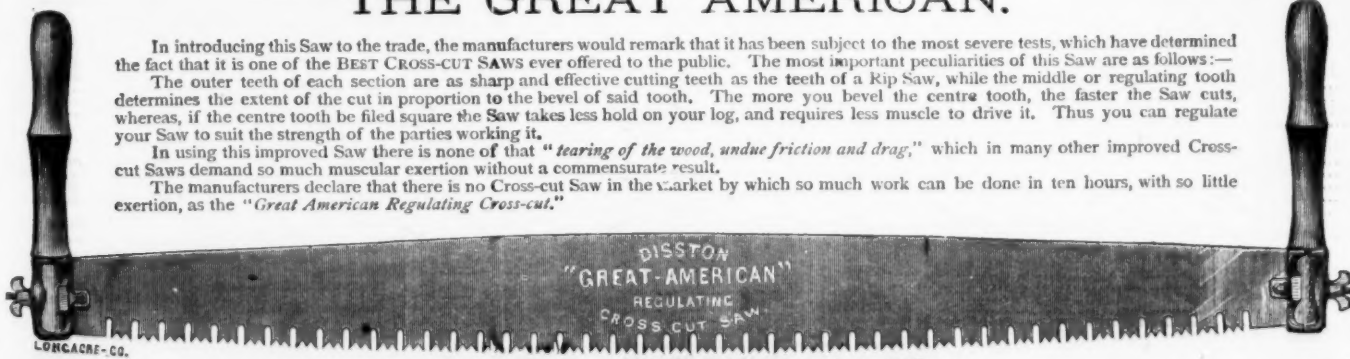
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—

The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.

In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.

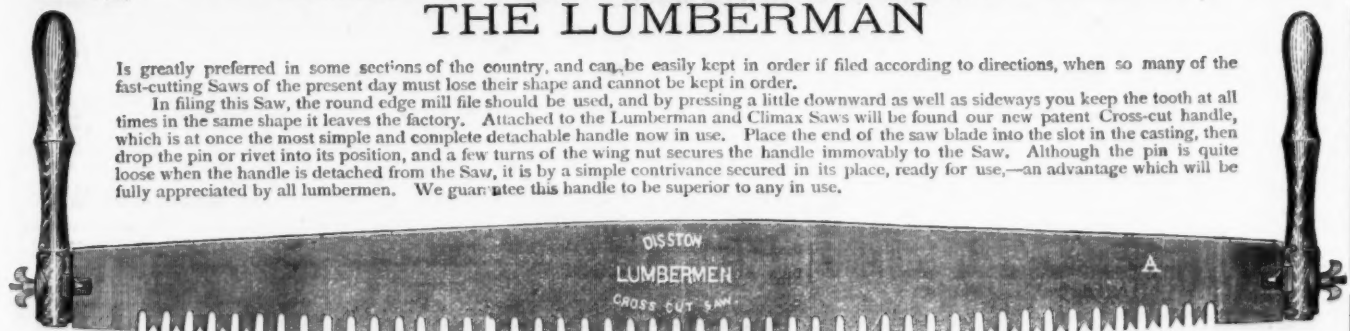
The manufacturers declare that there is no Cross-cut Saw in the market by which so much work can be done in ten hours, with so little exertion, as the "Great American Regulating Cross-cut."



THE LUMBERMAN

Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.

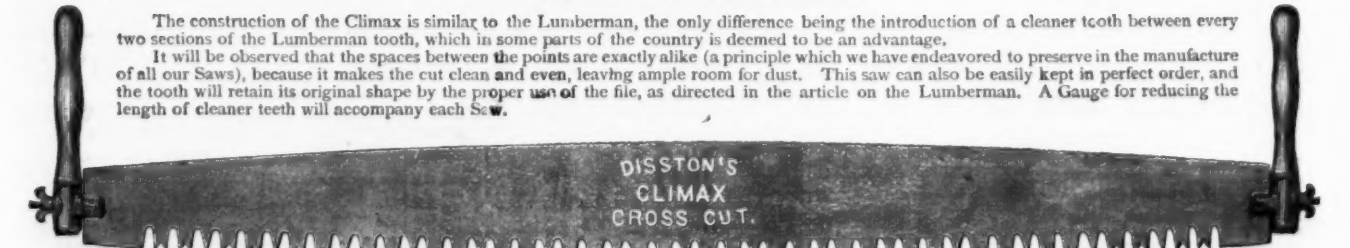
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.

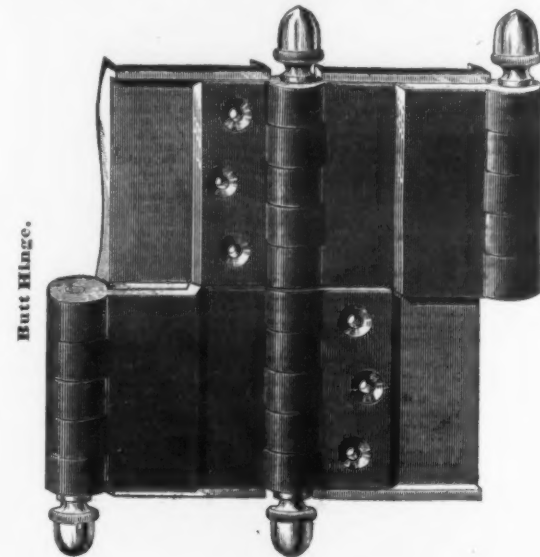
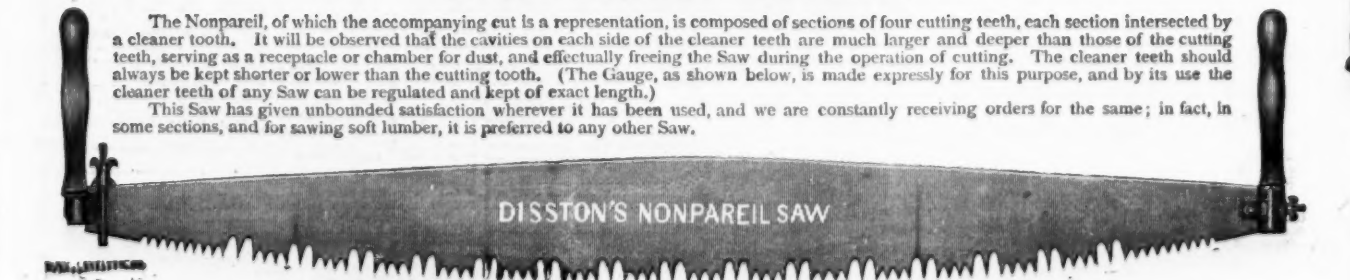
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



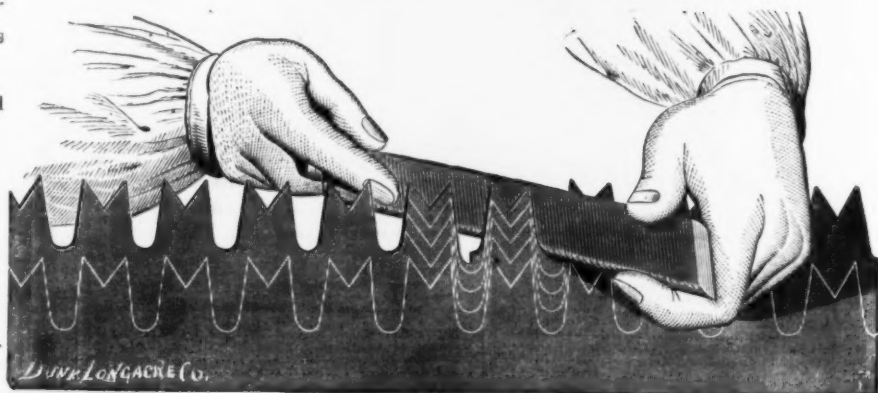
THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting teeth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)

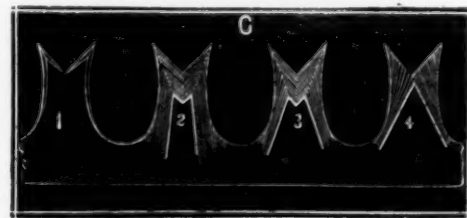
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.



Butt Hinge.



The above engraving represents a section of "Lumberman" Cross-Cut Saw, with File specially adapted for keeping said Saw in order. By using the File here illustrated, with the edge made to fit the gullet or space between the Teeth, and pressing downward while filing, you will preserve the original shape of the Teeth as described by dotted lines and notch in engraving. You pay for the edge of the File as well as the flat—then why not use it? and thus keep your Saw always gummy and in order, and avoid the risk of breaking or buckling the Saw by the old method of gumming. This File is manufactured expressly for the purpose of keeping in order the Teeth of our Improved Saws known as the Climax and Lumberman, and can be used with equal facility on either Saw. If the File be used according to our instructions, viz.: pressing down in the gullet at the same time the edge of the Tooth is being filed the effect will be so convincing that persons will never return to the use of the old style File, or any other of the so-called Improved Teeth. We also manufacture a File for keeping the Great American and Climax in order.

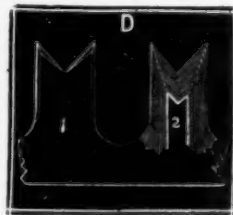


In the manufacture of all our Fast-Cutting Saws, we have carefully avoided the pernicious and destructive practice of making Under-Cut Teeth.

All Saws made on this principle are miserable failures. It is simply applying a Rip Tooth to the purpose of cross cutting, an idea which has been long ago exploded.

To get an Under Cut, the Tooth must be wider at the extreme point than at any other part, and each successive filing must result in rapid reduction in the width and ultimate loss of shape, as shown in the annexed diagram.

No. 1, Fig. C, represents the undercut Tooth as it leaves the factory; Nos. 2, 3, and 4, Fig. C, show how No. 1 most ultimately become under any style of filing that may be adopted. No. 1, Fig. D, shows a tooth with parallel edges, and No. 2, Fig. D, shows the shape of said tooth after several filings. The white lines on the diagrams represent the successive cuts of the file.



GAUGE FOR REGULATING CLEANING TEETH.

The Cleaning-Teeth of all Saws should be somewhat shorter than the Cutting Teeth, and, although shortened, they should be of uniform length throughout. The inner edge of the Gauge rests on the points of the Cutting Teeth, the Cleaning-Teeth projecting through the opening in center of Gauge. Reduce the projecting points by means of a File until arrested by the edges of the Gauge, which is made of hardened steel. Thus Tooth after Tooth can be rapidly and correctly reduced to an even length by any unskilled operator.



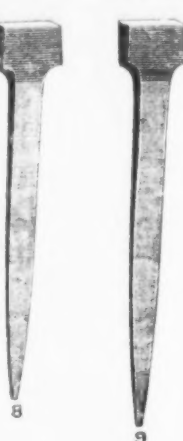
Showing the Gauge in Position for Filing the Cleaner-Teeth.

Henry Disston & Sons.

[illegible]

ware.

T & CO.,
Merchants, Buffalo, N. Y.
The Superior Brand,
RED HORSE NAILS.
Improved machinery and actually hammered fr



Three red horse nails are shown vertically. The first nail on the left is labeled '8' at its base. The middle nail is labeled '9' at its base. The third nail on the right is labeled '10' at its base. Each nail has a flat, rectangular head and a long, tapered point.

AXE COMPANY,
O, N. Y.
Sellers of the
STEEL AXES, HATCHETS, &c.,
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IRON HARDWARE WORKS.
SOLID SPUR AUGER BITS.

...SOLD BY CH. AUGER, BITS.

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 Shaves, &c.
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LY NEW.
ard & Co.'s
COAL HOD CASE.
 ne Size, Three Colors.

with pictures.....\$4 50 each
 n. gilt, with pictures.....4 30 "
 Gilt, with pictures.....4 20 "
 to the trade.

Sole Manufacturers,
PARD & CO., Buffalo, N. Y.
 GE. Agent, 99 Chambers Street, N. Y.



CLOSED.

GEO. M. EDDY & CO.,
 Manufacturers of Measuring Tapes,
 303 Nassau Avenue, Brooklyn, N. Y.



Manufacturers of Paine's Patent Steel Standard Measuring Tapes, for Surveyors, Engineers and Mechanics, ensuring a correct measure of great length according to S. Standard. Also of Tape measures for the same uses. Lumbermen, Machinists, Tailors, Shoemakers, Cabinetmakers &c. Catalogues on application.

Reese's Adjustable Stencil Letters.



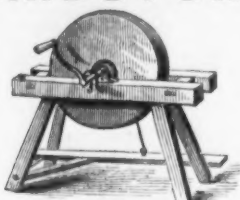
simple device, by which any name or address can be stamped in a moment, and be as readily distributed. For sale by hardware dealers and stationers. Send for circulars.

Purposes. Manufactured by
JAMES BOYD'S SONS,
 Nos. 10 & 12 Franklin St., N. Y.

A simple device, by which any name or address can be formed in a moment, and be as readily distributed. For sale by hardware dealers & stationers. Send for circulars.
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GRINDSTONES.**



SOLE AGENT OF THE
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**AMHERST,
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Also Scythe Stones.

WORTHINGTON & SONS, Mfrs.,
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Upon which to run the same, of all kinds.

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"Nature's Compound" of Copper, Mercury, Lead and Iron. A pure Oxide of Metals, containing no earthy matter, hence we claim and are prepared to prove that it is the best and cheapest paint in the market. Properly mixed, we will guarantee it to cover double the surface and wear twice as long as ordinary paints. It will not peel, Scale, Crack or Blister, though subjected to high degrees of heat. It will effectually prevent the Corrosion of Metals, even in mid-ocean. Warranted superior to red lead or any other lead for any and all purposes for which paint is required. Please send for circulars. All orders should be addressed, Wm. H. Corey, General Agent, 27 Sabin St., Providence, R. I.



**Bennett Hotchkiss and
N. C. Stiles' Patent.**

This Drop (which has been illustrated in this journal of that class in which the Hammer is raised by a stiff belt or board passing up between two friction rolls, and is so well known that we will only describe our improvements. The patents we are working under are those of Bennett Hotchkiss (who in an interference case with Goulding and Cheney was declared the first inventor) and N. C. Stiles. Our improvements consist: First.—Of an arrangement of parts that makes it the most complete rolling Hammer, and will take any plate to a great extent, of all other kinds for forging. In addition to the upright roll, which is operated by the hammer to open and close the rolls, we place another roll the lower end of which is secured to the end of a lever which is operated by the hand or foot, which operation also opens and closes the rolls at will. The lower end of this rod has a slot, so that the action of the hammer will not disturb the hand lever, thereby preventing the hand being injured, as otherwise would be the case. Second.—No dog is used on the upright to hold up the hammer. The belt or board passes up between two clamps situated under the rolls, so arranged that as the hammer ascends they will freely open of themselves, but on descending they will close and hold up the hammer. To let the hammer fall the clamps are opened by pressure upon the foot treadle. Third.—The hand or belt is secured to the hammer by an elastic connection, which prevents the sudden jar and destruction of the same. The back roll is made adjustable to different thicknesses of board or belt, as also are the clamps. An adjustable collar on the upright rod allows the operator to obtain any height of blow desired automatically. If one blow is wanted, press upon the treadle and remove the pressure as soon as the blow is given. Keep the foot upon the treadle and the blows will be repeated until the pressure is removed. If a blow of less height than the collar is set for is required, work the hand lever, which will give you any height of blow desired. The hammer can be held up at any height below the collar by bringing the hand lever into action when the hammer is at the desired height, so that the next blow can be given from a state of rest, of less height than the collar is set for. This is a feature no other drop has; that is, the first blow struck can be of less height than the second or third, and obtained from a state of rest. A gentle pressure upon the treadle will allow the hammer to go down slowly, but it will stop and remain suspended at any point as soon as the pressure is removed. The clamps in holding up the hammer keep the board from touching either roll and prevents the same from being worn uneven.

Manufactured only by the
Stiles & Parker Press Co.,
MIDDELTOWN, CONN.

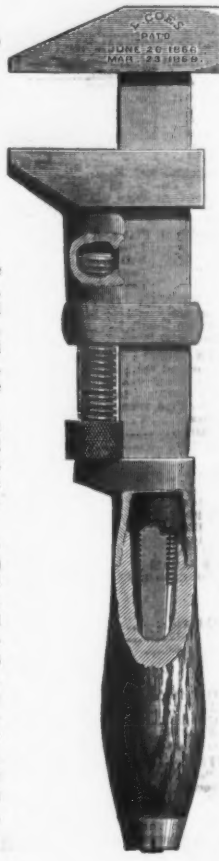
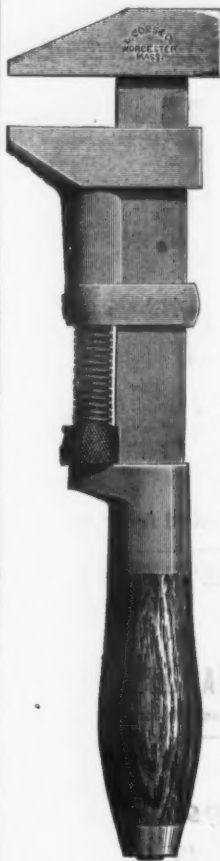
L. COES'

Genuine Improved Patent

SCREW WRENCHES.

Manufactured by

L. COES & CO.,
Worcester, Mass.



We invite the particular attention of the trade to our New Straight Bar Wrench, widened, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes, which were at once closely imitated and sold as the Genuine Wrench by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

"L. COES & CO."

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.
HORACE DURRIE & CO., Sole Agents.



Ausable Horse Nail Co.
MANUFACTURERS OF
**HAMMERED,
Hammer Pointed, Polished & Blued
HORSE NAILS,**

FROM
BENZON IRON.

Orders promptly filled at lowest market rates.
ABRAHAM BUSSING, Secretary,
35 Chambers Street, New York

GLOBE NAIL COMPANY,

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Pointed, Polished & Finished Horse Shoe Nails

Recommended by over 20,000 Horse Shoers.

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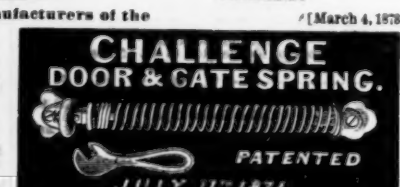
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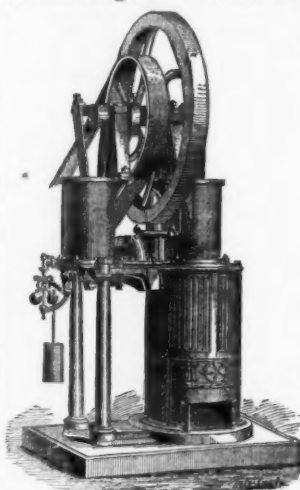
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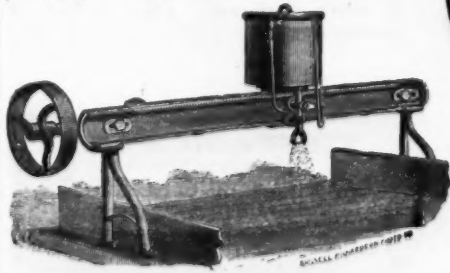
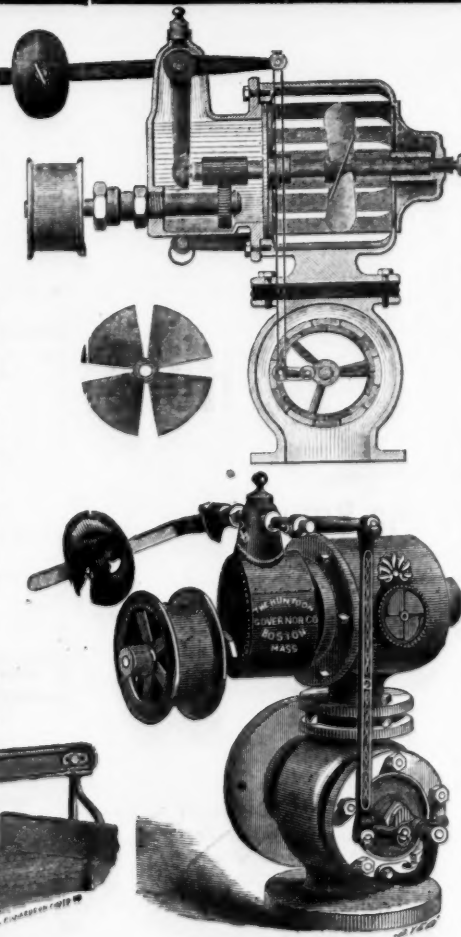
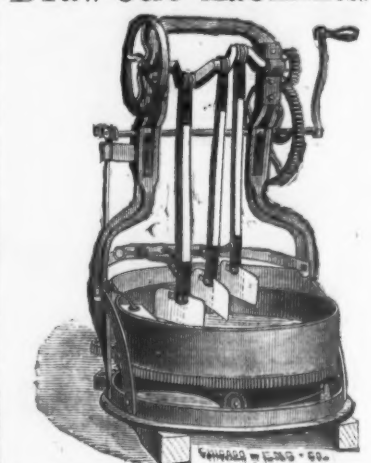
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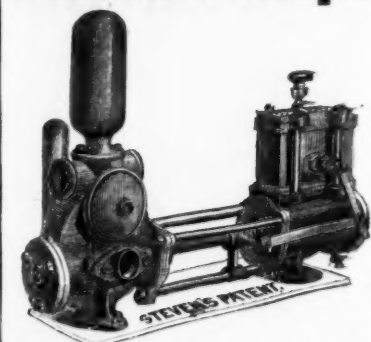
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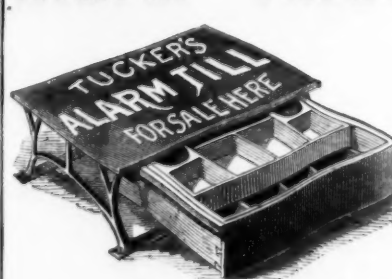
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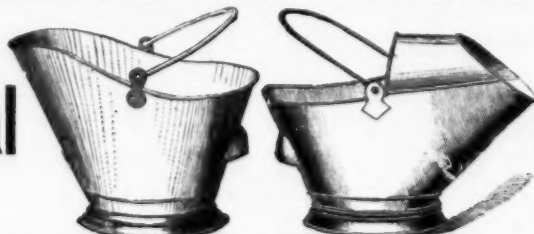
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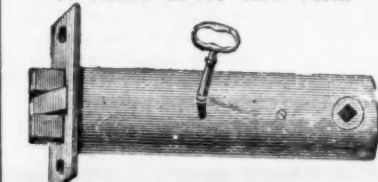
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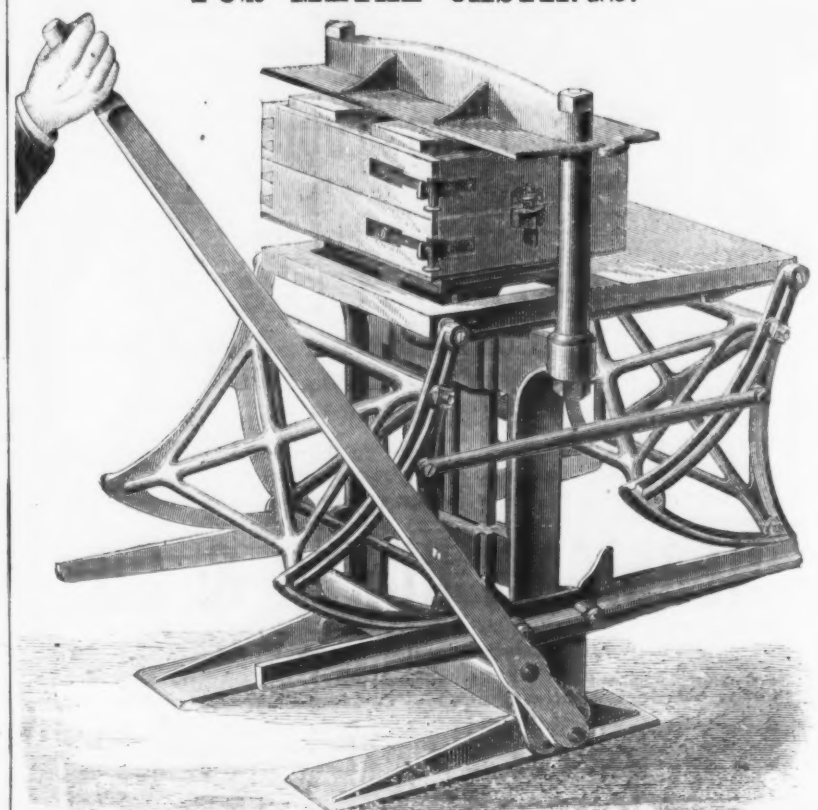
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Reversing.....	11 1/2
Parker's Blind Butts.....	11 1/2
Shepard's.....	11 1/2
Cherry Tree.....	11 1/2
Lull & Porter's Blind Butts.....	11 1/2
Chains—German Hammer.....	11 1/2
Coll.....	11 1/2
Galvanized Pump.....	11 1/2
Self Proof Oil Chain.....	11 1/2
By the case, 500 lbs., discount 1/2 per lb. Common.....	11 1/2
Chain, 1/2 per lb. less than proof.....	11 1/2
Chisels—Socket Framing.....	11 1/2
Socket Framing.....	11 1/2
Beaver's Framing and Firmer.....	11 1/2
Casters—Porcelain Wheel.....	11 1/2
Iron and Brass Wheels.....	11 1/2
Iron Bed.....	11 1/2
Clothes Wringers—Universal.....	11 1/2
Novelty.....	11 1/2
Discount in 5 dozen lots, \$2 per dozen.....	11 1/2
Coffee Mills—Blum's.....	11 1/2
Patent Box and Side.....	11 1/2
Casters—American Pocket (best).....	11 1/2
Lander, Frary & Clark's.....	11 1/2
Goodman Mfg. Co. Manufacturers' net prices.....	11 1/2
Drawing Knives—Hart Mfg. Co.....	11 1/2
Beatty.....	11 1/2
Fry Press.....	11 1/2
No. 1.....	11 1/2
No. 2.....	11 1/2
No. 3.....	11 1/2
No. 4.....	11 1/2
No. 5.....	11 1/2
No. 6.....	11 1/2
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No. 46.....	11 1/2
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No. 87.....	11 1/2
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No. 89.....	11 1/2
No. 90.....	11 1/2
No. 91.....	11 1/2
No. 92.....	11 1/2
No. 93.....	11 1/2
No. 94.....	11 1/2
No. 95.....	11 1/2
No. 96.....	11 1/2
No. 97.....	11 1/2
No. 98.....	11 1/2
No. 99.....	11 1/2
No. 100.....	11 1/2

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

Sept. 12, 1874.

Augers—Snell Mfg. Co.....	11 1/2
Bits, Auger—Snell Mfg. Co.....	11 1/2
Bells, Cow—Law's Genuine.....	11 1/2
Bolts—Carriage and Tire.....	11 1/2
Brace—Bitt, Spofford's Patent.....	11 1/2
Brace, Cut.....	11 1/2
Boards—Stove, Brooks' Patent.....	11 1/2
Butts—Broad, Loose Joint.....	11 1/2
Wrought Narrow.....	11 1/2
" Broad, Loose Joint.....	11 1/2
Beiting—Hubber.....	11 1/2
Leather, new list, oak tanned.....	11 1/2
Brick—Bath (box of 2 doz) Best English.....	11 1/2
" Rutherford.....	11 1/2
Chalk—White, Carpenter's.....	11 1/2
Red, Carpenter's.....	11 1/2
Blue.....	11 1/2
Chisels—Firmor Socket.....	11 1/2
Framing Socket.....	11 1/2
Corner socket Chisels.....	11 1/2
Slick's Carpenters.....	11 1/2
Castings—Malleable.....	11 1/2
Clothes Wringers, "Novelty" No. 2.....	11 1/2
Elbows—Corrugated.....	11 1/2
Charcoal.....	11 1/2
Russia.....	11 1/2
Files—Malachos Bros.....	11 1/2
Freezers—Ice Cream—Champion.....	11 1/2
Hammers—Wiley & Russell.....	11 1/2
Hinges—Window Blind.....	11 1/2
Clark's.....	11 1/2
Shapard's and Standard.....	11 1/2
Wrought Strap and T.....	11 1/2
Hods, Coal—Plain, Black and Galvanized.....	11 1/2
Box Union and Eagle.....	11 1/2
American.....	11 1/2
Salt—Clout and Finishing.....	11 1/2
Shoe.....	11 1/2
Horse, Assable.....	11 1/2
" Finished and Pointed.....	11 1/2
" Clifton.....	11 1/2
Packing—Rubber.....	11 1/2
Feathers—Plate—Scaptope.....	11 1/2
Case lots.....	11 1/2
Paint—White Lead, U. S. Gov't.....	11 1/2
Rivets—Iron, Black and Tinned.....	11 1/2
Hope—Mantle, 1/2 inch and larger.....	11 1/2
Staples—Blind, Boardman's Pat.....	11 1/2
Spoons, Iron Tinned.....	11 1/2
Plated Rogers' A No. 1.....	11 1/2
Britannia.....	11 1/2
Squares—Steel and Iron.....	11 1/2
Bugs, Horse—H. Burden & Sons.....	11 1/2
Saw—Henry Duxton & Sons.....	11 1/2
Scales—Buffalo Scale Works.....	11 1/2
Fairbanks.....	11 1/2
Traps, Steel—Newhouse.....	11 1/2
Tacks—Half Weight Am. Iron.....	11 1/2
Vises—Parallel, Buffalo.....	11 1/2
Wires—French, Tinned and Iron.....	11 1/2
Stamps and Japanned.....	11 1/2
Cast Iron Hollow.....	11 1/2
Tin Plates—Add for each X.....	11 1/2
10x11, 12, Charcoal.....	11 1/2
12x17, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100.....	11 1/2
Fig Tin—Strait.....	11 1/2
Solder.....	11 1/2
Sheet Zinc.....	11 1/2
" Lath.....	11 1/2
Sheets.....	11 1/2
Iron Wire—Bright and Annealed.....	11 1/2
Coppered.....	11 1/2
Tinned.....	11 1/2
Tinned Broom.....	11 1/2
Copper—Sheeting 14 to 18 oz.....	11 1/2
Bottoms.....	11 1/2
Brassiers' Sheets.....	11 1/2
Sheet Iron.....	11 1/2
24 Common.....	11 1/2
24 W. D. Wood & Co. Smooth Finish.....	11 1/2
Am. Russia.....	11 1/2
Gen. Russia, No. 1 stained.....	11 1/2
Galvanized.....	11 1/2

CINCINNATI.

Reported by Sellers & Co., Importers and Jobbers	
Tin Plates—Best Charcoal.....	11 1/2
10x11, 12, Charcoal.....	11 1/2
12x17, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100.....	11 1/2
Fig Tin—Strait.....	11 1/2
Solder.....	11 1/2
Sheet Zinc.....	11 1/2
" Lath.....	11 1/2
Sheets.....	11 1/2
Iron Wire—Bright and Annealed.....	11 1/2
Coppered.....	11 1/2
Tinned.....	11 1/2
Tinned Broom.....	11 1/2
Copper—Sheeting 14 to 18 oz.....	11 1/2
Bottoms.....	11 1/2
Brassiers' Sheets.....	11 1/2
Sheet Iron.....	11 1/2
24 Common.....	11 1/2
24 W. D. Wood & Co. Smooth Finish.....	11 1/2
Am. Russia.....	11 1/2
Gen. Russia, No. 1 stained.....	11 1/2
Galvanized.....	11 1/2

Sheet Iron.....	11 1/2
Gen. Russia.....	11 1/2
15 to 20.....	11 1/2
20 to 24.....	11 1/2
24 to 28.....	11 1/2
28 to 32.....	11 1/2
32 to 36.....	11 1/2
36 to 40.....	11 1/2
40 to 44.....	11 1/2
44 to 48.....	11 1/2
48 to 52.....	11 1/2
52 to 56.....	11 1/2
56 to 60.....	11 1/2
60 to 64.....	11 1/2
64 to 68.....	11 1/2
68 to 72.....	11 1/2
72 to 76.....	11 1/2
76 to 80.....	11 1/2
80 to 84.....	11 1/2
84 to 88.....	11 1/2
88 to 92.....	11 1/2
92 to 96.....	11 1/2
96 to 100.....	11 1/2

PITTSBURGH.

The following are the Card rates of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St., New York, Agent, card rate, 2 1/2 off net.	
Flat Head (1 1/2 x 1/2), punched and counter sunk.....	11 1/2
Iron Wedges.....	11 1/2
Norway Nail Rods.....	11 1/2
Cast Bars (in ordering please state whether.....	11 1/2
" Wedge or "Pinch" point.....	11 1/2
Beetle Blows.....	11 1/2
3/4 round, bent to shape, 50¢ ft. of fence, less 15¢ off net.	11 1/2
Carriage and Tire Bolts (new list).....	11 1/2
Flange Bolts.....	11 1/2
Coppered to 12.....	11 1/2
Machine and Square Head Bolts.....	11 1/2
Coach and Lag Screws.....	11 1/2
Pat. Hot Pressed Square and Hexagon Nuts.....	11 1/2
small sizes, from 3/16 to 3/4 in.....	11 1/2
Hot Pressed Hexagon Nuts.....	11 1/2
large sizes, from 3/4 to 2 in.....	11 1/2
Washers, all made from new band iron.....	11 1/2
large sizes, from 3/16 to 3/4 in.....	11 1/2
Nuts and Washers.....	11 1/2
Washers in lots less than one keg each size, 1¢ off net.	11 1/2
Nuts and Washers in 5 lb. boxes, 15¢ off net.	11 1/2
Patent Headed Harrow Teeth, packed in casks, 1/2 in. diam. 3/4 x 1/2 in.....	11 1/2
1 in. diam. 3/4 x 1/2 in.....	11 1/2
1 1/2 in. diam. 3/4 x 1/2 in.....	11 1/2
2 in. diam. 3/4 x 1/2 in.....	11 1/2
3 in. diam. 3/4 x 1/2 in.....	11 1/2
4 in. diam. 3/4 x 1/2 in.....	11 1/2
5 in. diam. 3/4 x 1/2 in.....	11 1/2
6 in. diam. 3/4 x 1/2 in.....	11 1/2
7 in. diam. 3/4 x 1/2 in.....	11 1/2
8 in. diam. 3/4 x 1/2 in.....	11 1/2
9 in. diam. 3/4 x 1/2 in.....	11 1/2
10 in. diam. 3/4 x 1/2 in.....	11 1/2
11 in. diam. 3/4 x 1/2 in.....	11 1/2
12 in. diam. 3/4 x 1/2 in.....	11 1/2
13 in. diam. 3/4 x 1/2 in.....	11 1/2
14 in. diam. 3/4 x 1/2 in.....	11 1/2
15 in. diam. 3/4 x 1/2 in.....	11 1/2
16 in. diam. 3/4 x 1/2 in.....	11 1/2
17 in. diam. 3/4 x 1/2 in.....	11 1/2
18 in. diam. 3/4 x 1/2 in.....	11 1/2
19 in. diam. 3/4 x 1/2 in.....	11 1/2
20 in. diam. 3/4 x 1/2 in.....	11 1/2
21 in. diam. 3/4 x 1/2 in.....	11 1/2
22 in. diam. 3/4 x 1/2 in.....	11 1/2
23 in. diam. 3/4 x 1/2 in.....	11 1/2
24 in. diam. 3/4 x 1/2 in.....	11 1/2
25 in. diam. 3/4 x 1/2 in.....	11 1/2
26 in. diam. 3/4 x 1/2 in.....	11 1/2
27 in. diam. 3/4 x 1/2 in.....	11 1/2
28 in. diam. 3/4 x 1/2 in.....	11 1/2
29 in. diam. 3/4 x 1/2 in.....	11 1/2
30 in. diam. 3/4 x 1/2 in.....	11 1/2
31 in. diam. 3/4 x 1/2 in.....	11 1/2
32 in. diam. 3/4 x 1/2 in.....	11 1/2
33 in. diam. 3/4 x 1/2 in.....	11 1/2
34 in. diam. 3/4 x 1/2 in.....	11 1/2
35 in. diam. 3/4 x 1/2 in.....	11 1/2
36 in. diam. 3/4 x 1/2 in.....	11 1/2
37 in. diam. 3/4 x 1/2 in.....	11 1/2
38 in. diam. 3/4 x 1/2 in.....	11 1/2
39 in. diam. 3/4 x 1/2 in.....	11 1/2
40 in. diam. 3/4 x 1/2 in.....	11 1/2
41 in. diam. 3/4 x 1/2 in.....	11 1/2
42 in. diam. 3/4 x 1/2 in.....	11 1/2
43 in. diam. 3/4 x 1/2 in.....	11 1/2
44 in. diam. 3/4 x 1/2 in.....	11 1/2
45 in. diam. 3/4 x 1/2 in.....	11 1/2
46 in. diam. 3/4 x 1/2 in.....	11 1/2
47 in. diam. 3/4 x 1/2 in.....	11 1/2
48 in. diam. 3/4 x 1/2 in.....	11 1/2
49 in. diam. 3/4 x 1/2 in.....	11 1/2

Steel.

THREE
CLASS PRIZE MEDALS.
CLASSES 1, 21, 22,
First Exhibition of Industry,
LONDON, 1874

MEDAL OF HONOUR,
SOCIETY OF ARTS & INDUSTRY,
LONDON, 1856.

1st CLASS
PRIZE MEDAL, CLASS 1st
UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1855.

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(Limited.)
SUCCESSORS TO
SAM'L COCKER & SON,
(Established 1752.)
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MANUFACTURERS OF
CAST, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.
BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO
GENERAL MERCHANTS.
Agent, JONATHAN HATTERSLEY, Cincinnati, O.

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Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS,

PUNCHES and all kinds of MACHINISTS' TOOLS.

Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools.

Warranted not to crack in hardening Taps of any size.

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BARROW IN FURNESS,
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Steel Rails, Tyres, Wheels,
Axles, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.

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For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for
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Unsurpassed, if equaled in quality.

Palley Lane Works, Sheffield, England.

Warehouse, 82 John St., New York.

Established 1810



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ARMITAGE'S GENUINE MOUSEHOLE ANVILS,

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**Cast and Double Shear
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Harris, Rice & Co., St. Louis, Mo.

Wood & Legent, Hamilton, C. W.

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Sheffield Steel Works.

(Established in 1848.)

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CAST STEEL,

Patent Rolled

SAW PLATES,

All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Seat Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,

Reaper Bars, Plow Bars, &c., &c.

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TIRE, TOE CORK, SLEIGH SHOE,

BLISTER & FLOW STEEL.

Also, Plow and other Iron.

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A full assortment of "Jenks" Spring Steel in stock.

MILLER, BARR & PARKIN,

Crescent Steel Works,

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Manufacturers of all descrip- of

STEEL

EQUAL TO ANY IN THE MARKET.

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Gunpowder.

GUNPOWDER

DUPONT'S

Sporting, Shipping, and Mining

POWDER.

DUPONT'S GUNPOWDER MILLS

ESTABLISHED IN 1801,

Have maintained their great reputation

years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle,

and Diamond Grain Powder.

Also, SPORTING, MINING, SHIPPING, AND BLAST-

ING POWDER.

of all kinds and descriptions.

For sale in all parts of the country. Represent-

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F. L. KNEELAND

70 Wall Street, NEW YORK.

GUN-POWDER

LAFLIN & RAND POWDER CO.

21 Park Row, New York,

invite the attention of the the Hardware Trade to

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The superiority is well known of our brands

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Orange Rifle, Orange Ducking

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SAFETY-FUSE at wholesale.

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HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

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Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

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FOR LOCOMOTIVES, BOILERS AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

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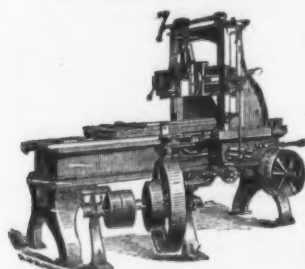
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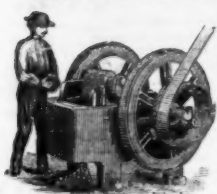
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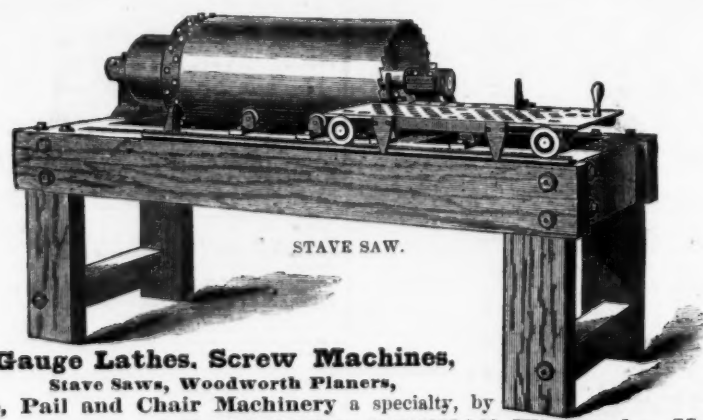


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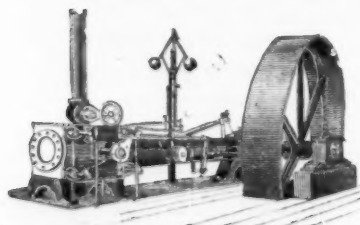
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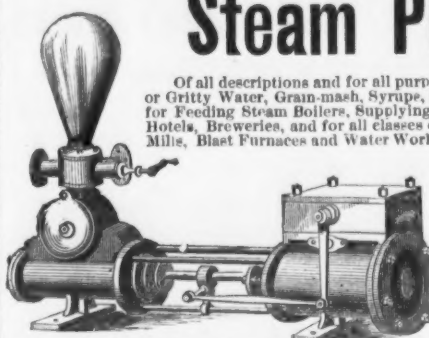
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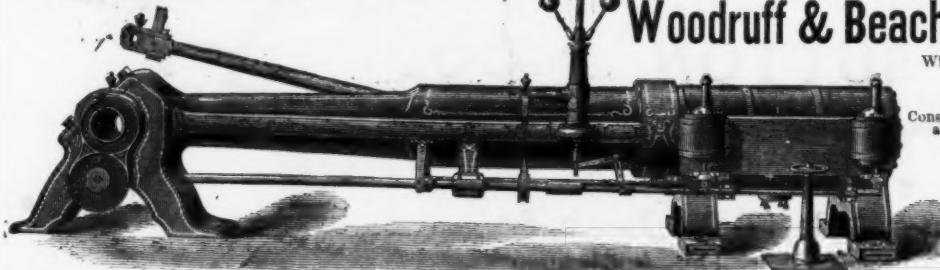
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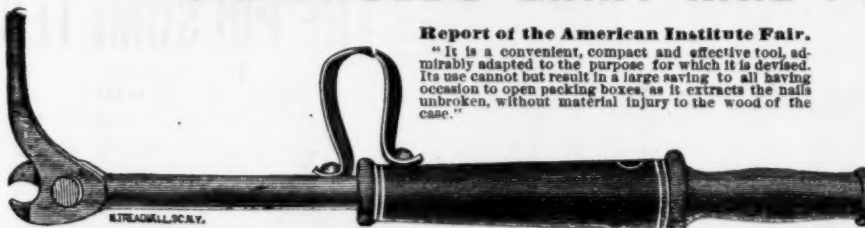
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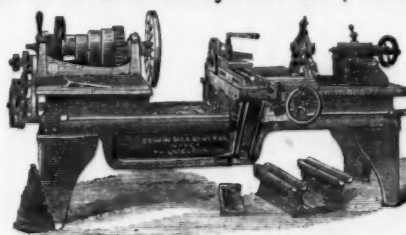
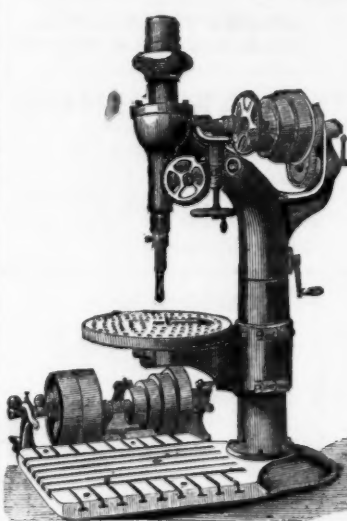
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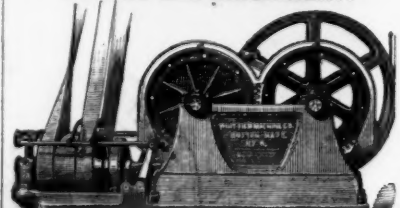


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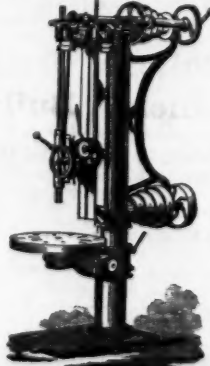
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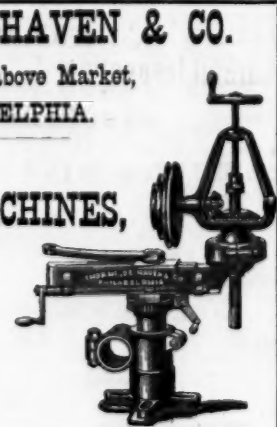
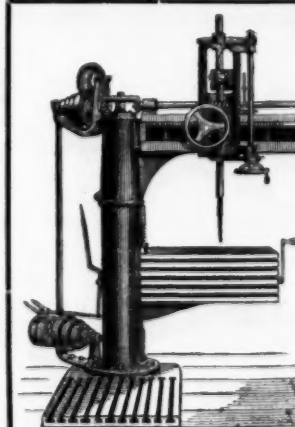
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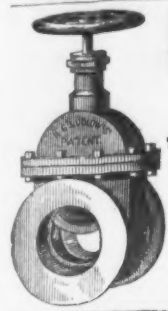
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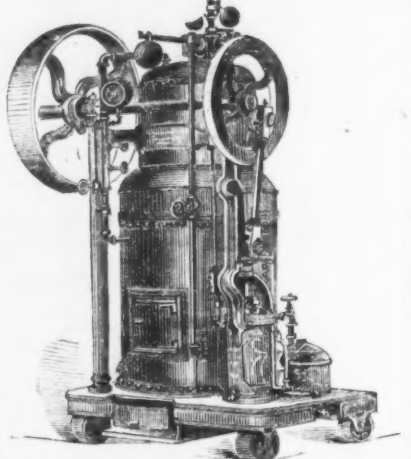
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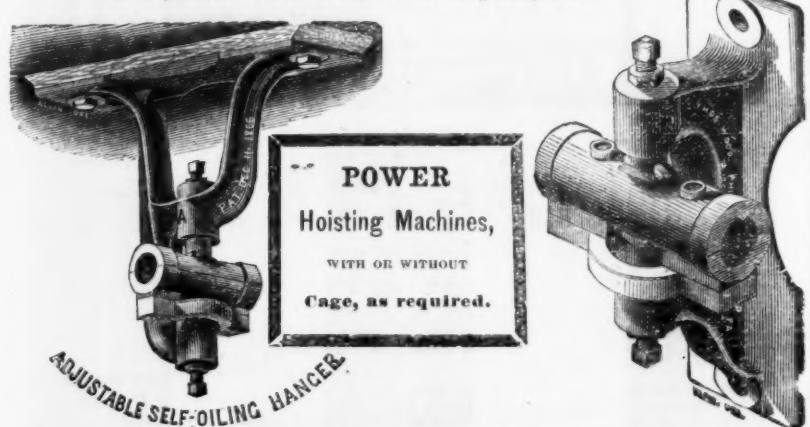
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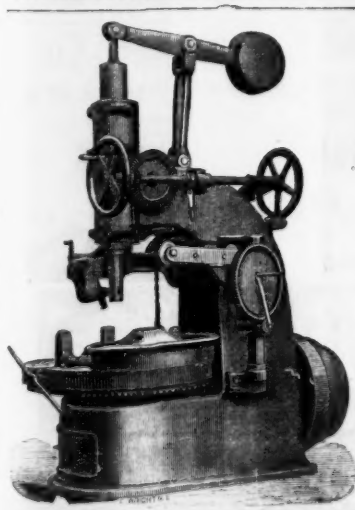
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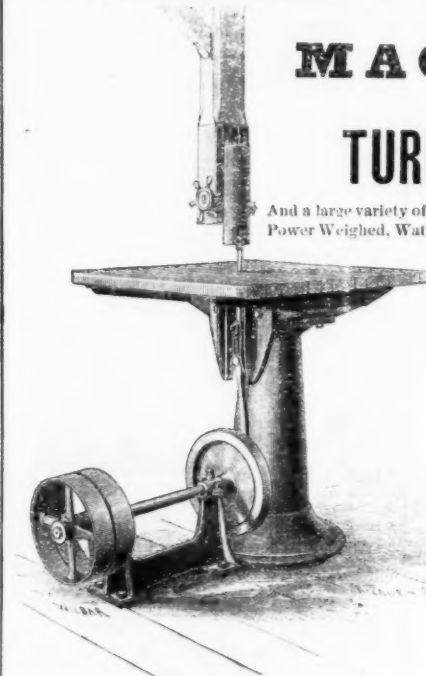
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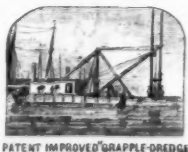
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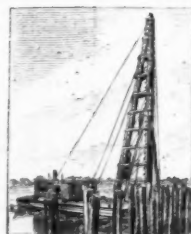
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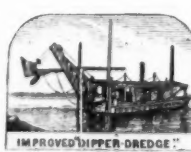
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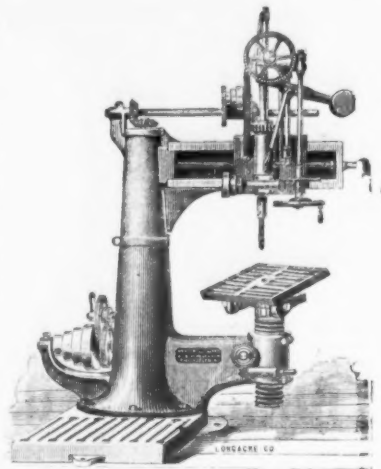
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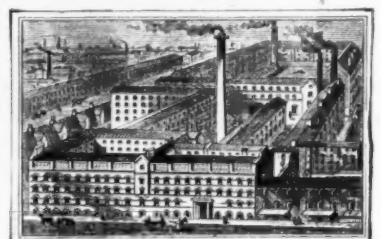
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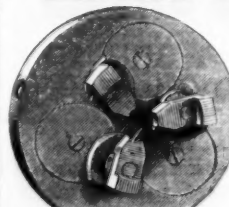
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